



PHILIPS

Service
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PHILIPS CIRCUITS

Volume 3

1971-1973

Published by
PHILIPS INDIA LTD., CENTRAL SERVICE DEPT.
BOMBAY-400010



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FOREWORD

PHILIPS CIRCUITS VOLUME I, published in January 1973, contains the circuit diagrams and Service Notes of Philips Radio Receivers released for sale in India from 1955 to 1965. It has been received most enthusiastically by the industry and trade.

PHILIPS CIRCUITS VOLUME 2 containing Service documentations of Philips Radio sets released in India from 1966 to 1970 was published in January 1975. It was received with equal enthusiasm by engineers, technicians and servicemen.


This is the third Volume which is called PHILIPS CIRCUITS VOLUME 3. It contains 15 diagrams of radio receivers, 5 of electrophones and players and 3 of battery eliminators released for sale in India from 1971 to 1973. Individual circuit diagrams of all equipments released from 1974 are available separately.

The code numbers given in the circuit diagrams are often replaced by recent code numbers. Therefore, for correct ordering of spare parts, the use may be made of PHILIPS SPARE PARTS GUIDE which will be available for sale from January 1977.

The current prices of Philips spare parts can be obtained from PHILIPS SPARE PARTS PRICELIST, a copy of which will be supplied free upon request.

For the use of engineers, technicians and servicemen, we have developed SERVICE AIDS. These are simple, convenient, yet accurate service instruments, which have been low-priced to suit the budget of independent servicemen. A list of such Service Aids is given at the beginning of the price list.

The SERVICE ENGINEER, the TECHNICIAN and the SERVICE-MAN who offers service to Philips customers is our friend. He is entitled to get our spare parts and documentations at reasonable prices. If any difficulty is experienced in obtaining circuit diagrams and service materials, the Central Service Department may please be contacted.



N. G. LOLAYEKAR
Central Service Manager.

Bombay,
1st September, 1976.

PHILIPS INDIA LIMITED
39/43 Nesbit Road,
Mazgaon, Bombay 400 010.

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MODEL-WISE LIST OF RADIO SETS RELEASED FROM 1955 TO 1976

Model No.	Trade Name	Year of Release	Model No.	Trade Name	Year of Release
15RL015/00R	Pocket Set	1971	15AL262/00R	Tiger	1976
15RL035/00R	Asia '72 Pocket Set	1972	B2CA66U	Philettina	1957
15RC069	Bahadur	1966	B2CA67U	Philettina	1958
15RC069/01B	Bahadur	1966	B2CA77U	Philettina	1959
15RC069/02B	Bahadur	1967	B2CA77U/01	Philettina	1960
15RL088/00B	Vikram	1968	15RC289	Viking	1968
15RC089/00B	Bahadur	1968	15RL297/00B	Prince	1969
15RC089/01B	Bahadur	1969	15RL297/00R	Prince	1970
15RC099/01B/11B	Bahadur Super 7	1969	15RC298/01R	Victor Deluxe	1969
15RL109/00B/00X	Bahadur	1970	15RC299/00R	Viking II	1969
BCA116U		1955	B2CA99U	Philettina	1961
15RL122/00E	Bahadur Deluxe II	1974	15RL301/00R	Prince	1970
15RL129/00B	Bahadur Deluxe II	1973	15RC306/00S	Philetta Transmains	1970
B1CA29U	Popular	1963	15RC306/00F/02F/02S	Philetta Transmains	1971
B1CA37U	Popular	1964	15RL307/00S	Philetta	1970
15RL201/10B	Philettina	1970	15RL307/00F/01F/02F/02S	Philetta	1971
15RL201/10S	Philettina	1971	B3CA07U	Philetta	1961
B2CA09U	Popular	1961	B3CA09T	Transistor Philetta	1962
15RL211/00X/00B	Philettina	1972	B3CA09T/02	Transistor Philetta	1963
90RL215/01R/06R		1974	15RL311/00B/00S	Prince Deluxe II	1971
B2CA17U	Philettina	1962	15RL311/01R	Prince Deluxe II	1974
B2CA17U/01	Philettina	1963	15RL312/00R	Philetta	1972
B2CA19T	Transistor Philettina	1963	15RL312/02R	Philetta	1975
B2CA19T/01	Transistor Philettina	1963	15RL312/03R	Philetta	1976
15RL221/00B/01B	Philettina Deluxe	1973	B3CA17U	Philetta Deluxe	1963
15RL221/11R	Philettina Deluxe	1975	B3CA17U/02	Philetta Deluxe	1964
B2CA29T	Transistor Philettina	1964	15RB327/00B	Pride	1972
BCA236U	Philettina	1956	15RB327/01B	Pride	1976
B2CA37U	Philettina	1964	BCA335U	Philetta	1955
B2CA49T	Transistor Philettina	1965			
15RL251/00E	Vijay	1975			
15RL252/00R/05R	Jawan	1975			
B2CA59T	Transistor Philettina	1966	15RL345/00R	Prince Deluxe 4	1974

Model No.	Trade Name	Year of Release	Model No.	Trade Name	Year of Release
BCA345U	Philetta	1956	L4CA38T/01	Transistor Portable	1964
15RL346/00R	Prince Deluxe	1974	L4CA38T/02/03/04	Transistor Portable	1966
	Transmains		B4CA39T	Transistor Minor	1964
B3CA47U	Philetta Super	1965	15RL447/00R	Commander	1974
B3CA47U/02/03	Philetta Super	1966			
BCA355U	Philetta	1957	B4CA47A	Minor	1965
B3CA66U	Philetta	1958	L4CA48T	Transistor Portable	1965
B3CA66U/02	Philetta	1958	B4CA49T	Transistor Minor	1965
15AB367/00B	Pride	1976	15RL452/00R	Valiant	1976
B3CA77U/02/03	Philetta	1959			
15RB378	Philetta Super	1967	BCA456A	International AC	1956
15RL378	Pioneer	1967	BCA456U	International AC/DC	1956
15RL378/01	Pioneer	1967	B4CA57A	Minor	1966
B3CA87U	Philetta	1960	B4CA57A/01	Minor	1966
B3CA87U/01	Philetta	1961			
15RL388/00B/01B	Pioneer	1968	B4CA59T	Transistor Minor	1966
15RC396/00R	Victor Transmains	1969	B4CA65A	International AC	1958
B4CA07A	Minor	1961	B4CA65U	International AC/DC	1958
			B4CA67A	International AC	1959
15RL407/00B	Pioneer	1971			
15RL407/00S	Pioneer	1970			
B4CA07T	Transistor Minor	1961	B4CA67A/01	International AC	1959
15RL412/00R	Commander	1972	B4CA67U	International AC/DC	1959
			B4CA67U/01	International AC/DC	1959
B4CA17A	Minor	1962	15RB477	Valiant	1967
L4CA18T	Transistor Portable	1963			
L4CA18T/01	Transistor Portable	1963	15RL478	Commander	1967
B4CA19T	Transistor Minor	1962	15RC479	Transistor Valiant	1967
			15RB487	Valiant	1968
15RB427	Valiant II	1972	B4CA87A	International AC	1960
B4CA27A	Minor	1963			
L4CA28T	Transistor Portable	1964			
B4CA29T	Transistor Minor	1963	B4CA87U	International AC/DC	1960
BCA435A	International AC	1956	15RC488	Commander II	1968
BCA435U	International AC/DC	1956	15RC489	Transistor Valiant	1968
BCA436A	International AC	1955	B4CA89U	International AC/DC	1961
BCA436A/01	International AC	1956			
BCA436U	International AC/DC	1955	B4CA96T	Transistor Ace	1960
B4CA37A	Minor	1964	B4CA96T/01	Transistor Ace	1961

Model No.	Trade Name	Year of Release	Model No.	Trade Name	Year of Release
15RB497	Valiant II	1969	B5CA66A	Major Novosonic	
B4CA97A	International AC	1961		AC	1958
15RC498/00X/01X	Commander II	1969	B5CA66U	Major Novosonic	
B4CA98U	International			AC/DC	1958
	AC/DC	1961	B5CA67A	Major Novosonic	
				AC	1958
15RB505/00Z	Prestige	1969	B5CA67U	Major Novosonic	
15RB506/00	Major	1971		AC/DC	1959
B5CA06T	Transistor Ace	1961	B5CA86A	Major Novosonic	1960
15RL507/00R	Skipper	1970	15RB587	Major	1967
			15RB587/01S	Major	1968
15RC509/00	Transistor Ace	1970	B5CA97A	Major Novosonic	1962
15RC509/01S	Transistor Ace	1971			
B5CA17A	Major	1963	B6CA37A	Maestro	1964
B5CA17A/01	Major	1964	B6CA37A/01	Maestro	1964
			BCA645A		1955
15RL517/00B	Skipper	1971			
15RL518/00B	Skipper Transmains	1973	BCA645U	Maestro	1955
B5CA19T	Transistor Ace	1963	BCA655A	Maestro	1956
15RB525/00Z	Prestige	1972	BCA655U	Maestro	1956
			BCA656U	Maestro	1957
15RB525/11Z	Prestige	1974	B6CA57A/01	Maestro	1967
B5CA29T	Transistor Ace	1963			
B5CA29T/01	Transistor Ace	1964	B6CA65A	Maestro	1957
15RB536/00	Major	1974	B6CA67A	Maestro	1959
			15RB677	Maestro II	1967
B5CA37A	Major	1964	B6CA77A	Maestro	1960
B5CA39T	Transistor Ace	1964			
B5CA47A	Major	1966	15RB677/01S	Maestro II	1968
B5CA49T	Transistor Ace	1965	B6CA86A	Maestro Bi-Ampli	1961
			15RB697	Maestro II	1969
B5CA49T/01	Transistor Ace	1965	B6CA97A	Maestro Bi-Ampli	1961
15RB556/00S	Prestige	1975			
B5CA57A	Major	1966	15RB708/00S	Stereo Radio	1970
B5CA57A/01	Major	1966	15RH738/00Z/01Z	Stereo AM/FM	1975
				Tuner Amplifier	

**MODEL-WISE LIST OF BATTERY ELIMINATORS GRAMOPHONES
AND INFRAPHIL APPARATUS RELEASED
FROM 1970 TO 1976**

Model No.	Year of Release	Trade Name
Battery Eliminators		
NP1931	1970	
15ER3001/00R	1972	
15ER3002/00	1973	
15ER3003/00	1975	
Gramophones		
15GA632	1971	Stereo Player
15GA732/00	1974	Hi-Q International Stereo Player
15GA732/02	1975	Hi-Q International Stereo Player
15GC032	1971	
15GF533/00	1973	Mains/Battery Portable Music System
15GF533/01	1975	Mains/Battery Portable Music System
15GF633	1976	Classic Convertible
15GF832	1971	Stereo System
15GF832/06/06S	1972	Stereo System
15GF832/07	1975	Stereo System
15GF932/00	1974	Hi-Q International Stereo System
Infraphil Apparatus		
HL4307	1975	

YEAR-WISE LIST OF RADIO SETS RELEASED FROM 1955 TO 1976

1955

BCA116U	
BCA335U	Philetta
BCA436A	International AC
BCA436U	International AC/DC

BCA645A
BCA645U

1956

BCA236U	Philettina
BCA345U	Philetta
BCA435A	International AC
BCA435U	International AC/DC

BCA436A/01	International AC
BCA456A	International AC
BCA456U	International AC/DC
BCA655A	

BCA655U

1957

B2CA66U	Philettina
BCA355U	Philetta
BCA656U	
B6CA65A	

1958

B2CA67U	Philettina
B3CA66U & U/02	Philetta
B4CA65A	International
B4CA65U	International AC/DC

B5CA66A	Major Novosonic AC
B5CA66U	Major Novosonic AC/DC
B5CA67A	Major Novosonic AC

1959

B2CA77U	Philettina
B3CA77U/02/03	Philetta
B4CA67A & A/01	International AC
B4CA67U & U/01	International AC/DC

1959 (contd)

B5CA67A	Major Novosonic AC/DC
B6CA67A	Maestro

1960

B2CA77U/01	Philettina
B3CA87U	Philetta
B4CA87A	International AC
B4CA87U	International AC/DC

B4CA96T	Transistor Ace
B5CA86A	Major Novosonic
B6CA77A	Maestro

1961

B2CA09U	Popular
B2CA99U	Philettina
B3CA07U	Philetta
B3CA87U/01	Philetta

B4CA07A	Minor
B4CA07T	Transistor Minor
B4CA89U	International AC/DC
B4CA96T/01	Transistor Ace

B4CA97A	International AC
B4CA98U	International AC/DC
B5CA06T	Transistor Ace
B6CA86A	Maestro Bi-Ampli

B6CA79A	Maestro Bi-Ampli
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1962

B2CA17U	Philettina
B3CA09T	Transistor Philetta
B4CA17A	Minor
B4CA19T	Transistor Minor

B5CA97A	Major Novosonic
---------	-----------------

1963

B1CA29U	Popular
B2CA17U/01	Philettina

1963 (contd.)

B2CA19T	Transistor Philettina
B2CA19T/01	Transistor Philettina
B3CA09T/02	Transistor Philetta
B3CA17U	Philetta Deluxe

L4CA18T	Transistor Portable
L4CA18T/01	Transistor Portable
B4CA27A	Minor
B4CA29T	Transistor Minor

B5CA17A	Major
B5CA19T	Transistor Ace
B5CA29T	Transistor Ace

1964

B1CA37U	Popular
B2CA29T	Transistor Philettina
B2CA37U	Philettina
B3CA17U/02	Philetta Deluxe

L4CA28T	Transistor Portable
B4CA37A	Minor
L4CA38T/01	Transistor Portable
B4CA39T	Transistor Minor

B5CA17A/01	Major
B5CA29T/01	Transistor Ace
B5CA37A	Major
B5CA39T	Transistor Ace

B6CA37A	Maestro
B6CA37A/01	Maestro

1965

B2CA49T	Transistor Philettina
B3CA47U	Philetta Super
B4CA47A	Minor
L4CA48T	Transistor Portable

B4CA49T	Transistor Minor
B5CA49T	Transistor Ace
B5CA49T/01	Transistor Ace

1966

15RC069	Bahadur
15RC069/01B	Bahadur
B2CA59T	Transistor Philettina
B3CA47U/02/03	Philetta Super

L4CA38T/02/ 03/04	Transistor Portable
B4CA57A	Minor
B4CA57A/01	Minor
B4CA59T	Transistor Minor

B5CA47A	Major
B5CA57A	Major
B5CA57/01	Major

1967

15RC069/02B	Bahadur
15RB378	Philetta Super
15RL378	Pioneer
15RL378/01	Pioneer

15RB477	Valiant
15RL478	Commander
15RC479	Transistor Valiant
15RB587	Major

B6CA57A/01	Maestro
15RB677	Maestro II

1968

15RL088/00B	Vikram
15RC089/00B	Bahadur
15RC289	Viking
15RL388/00B/ 01B	Pioneer

15RB487	Valiant
15RC488	Commander II
15RC489	Transistor Valiant
15RB587/01S	Major
15RB677/01S	Maestro II

1969

15RC089/01B	Bahadur
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YEAR-WISE LIST OF BATTERY ELIMINATORS GRAMOPHONES AND INFRAPHIL APPARATUS RELEASED FROM 1970 TO 1976

Battery Eliminators

1970

NP1931

1972

15ER3001/00R

1973

5ER3002/00

1975

15ER3003/00

Gramophones

1971

15GC032

15GA632

Stereo Player

15GF832

Stereo System

1972

15GF832/06/06S Stereo System

1973

15GF533/00 Mains/Battery Portable Music System

1974

15GA732/00 Hi-Q International Stereo Player

15GF932/00 Hi-Q International Stereo System

1975

15GF533/01 Mains/Battery Portable Music System

15GA732/02 Hi-Q International Stereo Player

15GF832/07 Stereo System

1976

15GF633 Classic convertible

Infraphil Apparatus

1975

HL4307

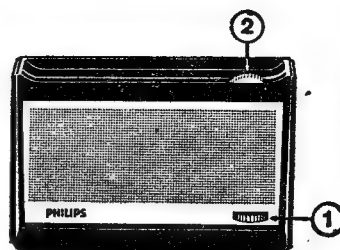
C I R C U I T S Y M B O L

Symbols	Description	Symbols	Description
	Electrolytic Capacitor		Transistor—(PNP) Type
	Variable Capacitor (Continuously adjustable)		Transistor—(NPN) Type
	Ceramic Capacitor		Valve
	Mica Capacitor		Indicator Lamp
	Polyester Capacitor		Pick-up
	Polystyrene Capacitor		Loudspeaker
	Paper Capacitor		L/S Socket
	Wire Trimmer		Switch
	Air Trimmer		Battery
	Carbon Resistor—1/8 Watt		Earth/Chassis
	Carbon Resistor—1/4 Watt		Direct Current
	Carbon Resistor—1/2 Watt		Alternating Current
	Carbon Resistor—1 Watt		Connection for Tape Recorder
	Carbon Resistor—2 Watt		Aerial, General Outdoor
	Coil		Loop/Frame Aerial
	AF Transformer		Plate Aerial
	RF/IF Transformer		Composite Unit
	Metal Rectifier, or Crystal Diodes		Motor
			Indicator Meter



PHILIPS Service manual

RADIO 15RL015/00R



Year of release 1971

For 6 Volts Battery Supply

Waverange

MW : 185—580m (1620—520 Kc/s)

Controls

- (1) On/Off switch and volume control
- (2) Tuning

Transistors and Diodes

TR1 to TR3 : 3×AF117
TR4 : BC 158 B
TR5/TR6 : 2×AC 128 (Matched pair)
X1 : OA49

Battery type

4×1.5 volts cell
Eveready 1015, Tudor T1200 or equivalent

Built-in-aerial

Ferroceptor is provided

Loudspeaker

2415 258 23803 (Z=15 ohms)

Consumption

Approximately 13 to 18.5 mA at minimum position of volume control.

Note : (1) Select resistor R16—390K, 470K or 620K for TR4 collector current of 3 to 4 mA

(2) Select resistors R18/R20 of value 68, 82 or 100 ohms for TR5/TR6 collector current of $5.5 \pm 2\text{mA}$.

TRIMMING THE RECEIVER :—

Refer to circuit diagram.

General

Disconnect the loudspeaker and substitute a matching resistor of 15 ohms. Set the volume control to maximum. Connect an output meter across load resistor. Adjust pointer to 'A' at maximum capacity of varco.

IF Circuits

Adjust gang condenser to minimum capacity. Apply modulated signal of 452 Kc/s via 33 KpF condenser to base of TR1. Successively trim S12/S14, S9/S11 and S6/S8 for maximum output.

HF Circuits

(Refer trimming data)

Trim at point B and C with signals for maximum output as shown in trimming data.

15RL015/00R

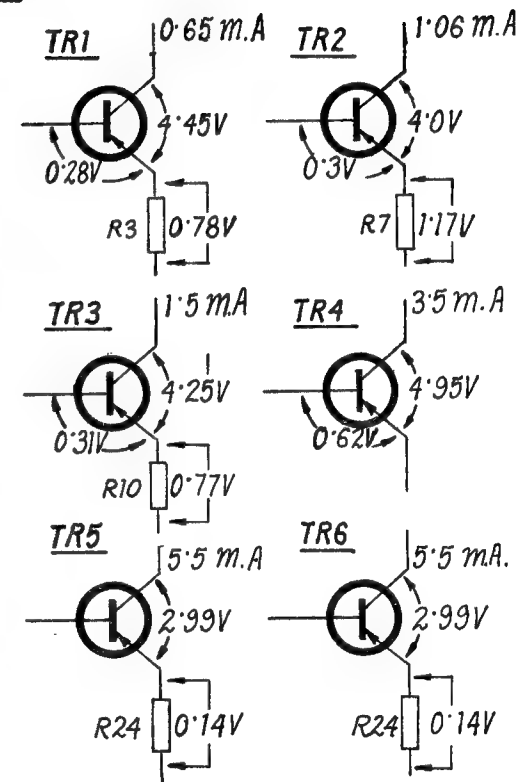
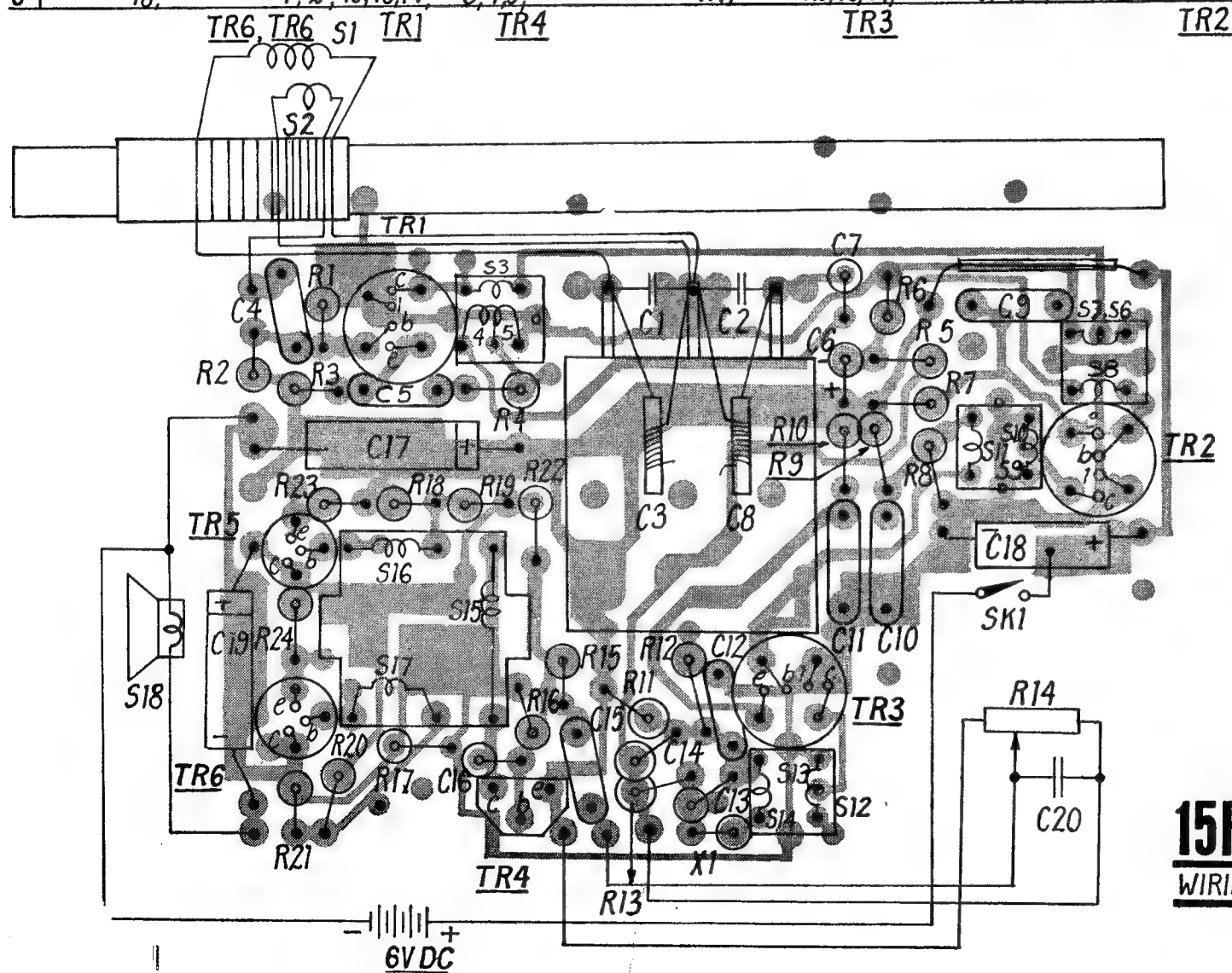
MECHANICAL PARTS

Description	Code No.	Description	Code No.
Cabinet (front) ...	3115 209 00161	Tuning spindle ...	3115 201 60710
Cabinet (back cover) ...	3115 209 00171	Drive Pulley ...	3122 101 73550
Grille (front) ...	3115 205 10591	Battery contact plate assy (near volume control) ...	3115 209 00141
Battery door ...	3115 204 02760	Battery contact plate assy (near speaker) ...	3115 209 00151
Pointer ...	3115 205 10580	Nut for fixing volume control ...	3115 200 40260
Knob—Volume ...	3115 204 02740	Screw for fixing :	
Knob—Tuning ...	3115 204 26240	Front and Back assy ...	2522 001 07096
Drum ...	3115 204 02730	Printed board ...	2515 123 89028
Spring for drive cord ...	3115 201 00690	Drum ...	2522 031 07078
Ferroceptor holder assy. ...	3115 204 03750	Varco ...	2522 001 07075
Grommet for ferroceptor ...	3115 204 02930		
Emblem ...	3115 200 00050		
Ring for volume control knob ...	3122 100 40770		

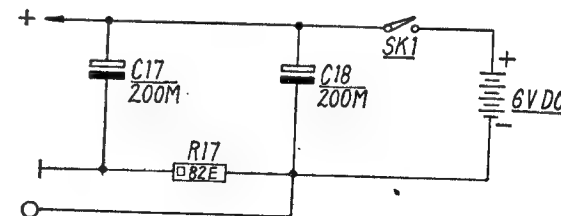
ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R14 (10,000 ohms) ...	2315 381 74427	C9, C10, C11, C15 (100 KpF) ...	2015 629 01104
C4, C12 (47 KpF) ...	2015 629 01473	C13, C14 (8K2 pF) ...	2015 629 04822
C5 (15 KpF) ...	2015 629 03153	C16 (100 pF) ...	2015 360 41001
C6 (4 MFd) ...	2215 001 17408	C17, C18 (200 MFd) ...	2215 001 13201
C7 (195 pF) ...	2015 301 96001	C19 (250 MFd) ...	2215 001 12251

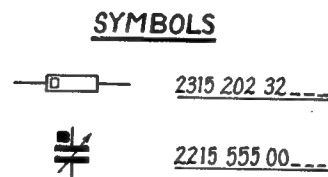
R	2, 21	1, 20,	18,	19, 4, 16,	15, 11, 12,	10,	6, 5, 7,	14,
R	24, 23, 3,	17,	22,	13,	9,	8,		
C	19, 4,	5,	16,	15,	1, 14, 12, 2,	6, 7, 10,	9,	
C		17,		3,	13, 8,	11,	18, 20,	
S	18,	1, 2, 15, 16, 17,	3, 4, 5,	X1,	12, 13, 14,	9, 10, 11,	6, 7, 8,	



15RL 015/00R
WIRING DIAGRAM



15RL 015/00R
CIRCUIT DIAGRAM.



TRIMMING DATA.

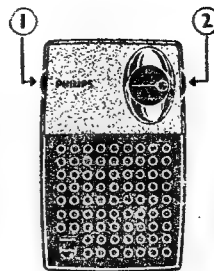
MW 560Kc/s 1500Kc/s

 A B (S3,4,5/51,2) C. (C8/C3)



PHILIPS Service manual

RADIO 15RL035/00R



Year of release 1972

For 3 Volts Battery Supply

Waverange

MW : 185 - 580 m (1622 - 517 kHz)

Control Knobs

1. On/Off switch and volume control (R11)
2. Tuning

Transistors and diodes

TR1 : BF194B
TR2 : BF195C
TR3 : CIL464/BC149C/BC148C
TR4/TR5 : 2×AC188 (matched pair)
X1 : OA79

Loudspeaker

3115 108 70850 (Z = 8 ohms)

Battery type

3 volts (2×1.5 volts cell type Eveready 1015 or equivalent)

Consumption

Approximately 16 ± 3 mA with volume control in minimum position

Built-in-Aerial

Ferroceptor is provided

Trimming the receiver :—

Refer circuit diagram

General

Disconnect the loudspeaker and connect 8 ohms resistor in place of speaker. Set to be trimmed at 3 volts DC supply. Set the volume control to maximum.

IF Circuits

Keep varco in minimum capacity position. Apply modulated signal of 452 kHz through 33 KpF capacitor to base of transistor TR1 and trim coils D and C for maximum output.

RF Circuits

Trim for maximum output at frequencies shown in trimming data.

Note :

- (1) In position R13, the value of resistors used are as follows to suit the matched output transistor pairs 2×AC 188.

160 ohms	...	A, B pairs
180 ohms	...	C, D pairs
200 ohms	...	E, F pairs
220 ohms	...	G pairs

- (2) Capacitor C14 (10 pF) used with A & B pairs of output transistors only.

MECHANICAL PARTS

Description		Code No.	Description	Code No.
Front Assy	...	3115 109 00891	Battery Contact Spring (—ve)	3115 101 00540
Back Cover	...	3115 104 03541	Battery Contact Tag (+ve) ...	3115 101 61250
Battery Door	...	3115 109 00901	Spring for Fixing Speaker ...	3115 101 00520
Knob (tuning)	...	3115 104 03570	Strap for removing batteries ...	3115 104 03780
Knob (volume control)	...	3115 104 03591	Battery Label	3115 100 01670
Dial Indicator	...	3115 105 00771	Screw for fixing :—	
Emblem	...	3115 100 01660	Printed Board × 2	2515 123 89001
Lens	...	3115 104 03620	Knob (tuning)	2522 001 07076
				or 2522 001 08076
Elliptical Ring	...	3115 104 03600		
Battery Control Spring	...	3115 101 00530	Varco × 2	3115 100 40401

ELECTRICAL PARTS

Part No.		Code No.	Part No.	Code No.
R11 (20K ohms)	...	2115 440 00028	C4 (15K pF)	2015 629 03153
C2, C6, C7, C8, C13 (100K pf)	...	2015 552 02104	C5 (6.4 mF)	2222 001 16648
C3 (68 pF)	...	2015 300 07689	C9, C10 (8K2 pF)	2015 629 04822
	... or	2015 361 46809	C11, C12 (200mF)	2015 027 43201

During production of this receiver the following changes have been introduced :

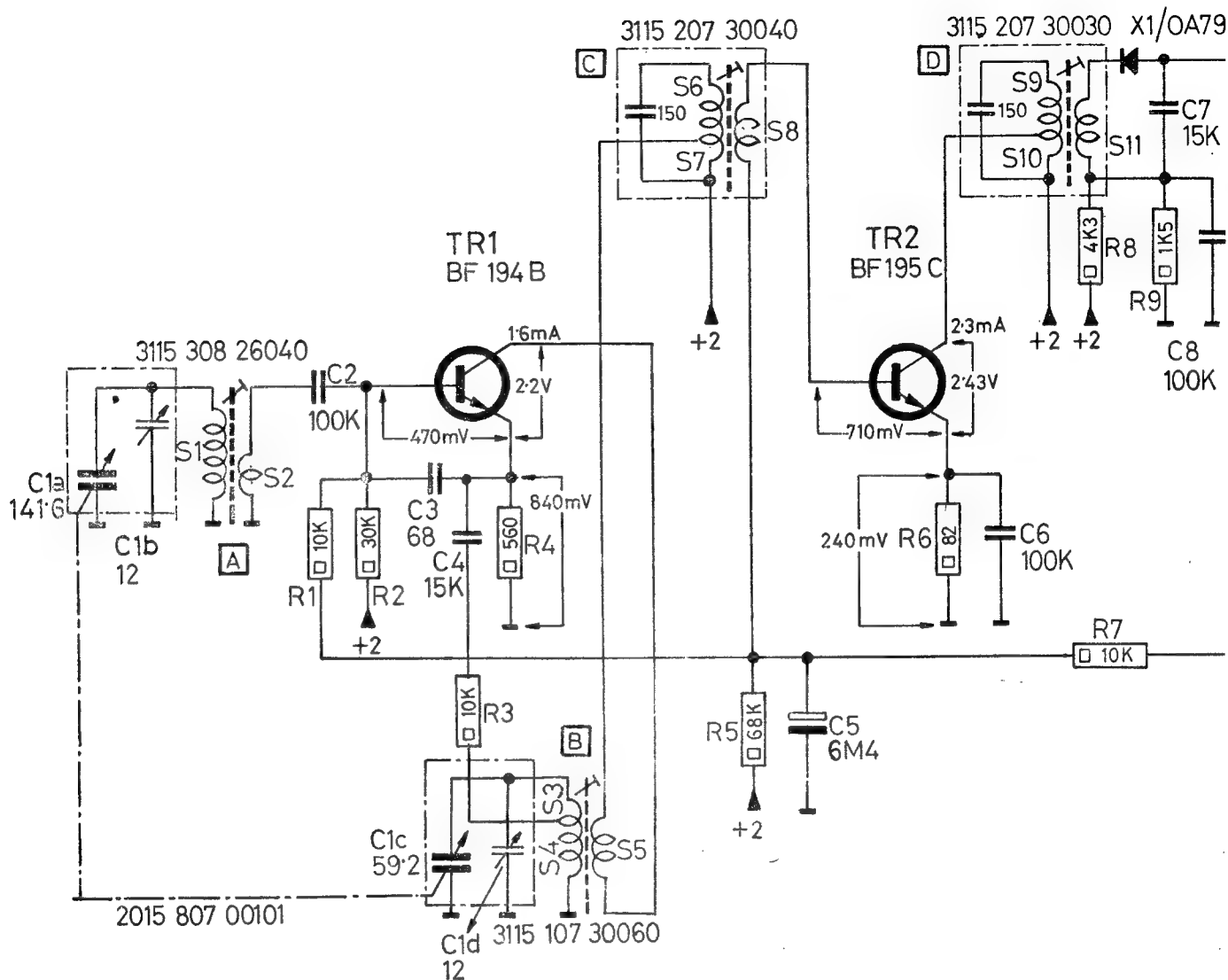
Part No.	Deleted	Added
R3	2315 202 32103	2315 202 32109
R17	...	2315 202 32479
C3	2015 300 07689 or 2015 361 46809	(in series with base of TR1) 2215 555 55479

TRIMMING DATA :

Trimming Frequency	Pointer Position	Adjust for maximum output
		Oscillator Antenna
515 KHz	Varco max.	B (S3/4/5) ...
1630 KHz	Varco min.	C 1d ...
570 KHz	Tune	... A (S 1/2)
1500 KHz	Tune	... C1b

- Note :
- Value of R12 should be 750K Ohms.
 - Code number of screw fixing Volume Control knob is 3115 109 10851.
 - Varco 205 807 00101 is replaced by 2215 807 10021, In Varco 2215 807 10021 its antenna earth and Oscillator tags are in the reverse order compared to the Varco 2015 807 00101. Hence the following changes and associated modifications are introduced :
 - Print from Coil B (S3) is shifted to the existing C1a soldering point after suitably cutting the earlier copper island.
 - Ferroceptor (S1) connection is shifted from the existing C1a to C1c point.
 - Dial indicator 3115 105 00771 is replaced by 3115 105 00981.
 - Oscillator Coil 3115 107 30061 is replaced by 3115 107 30221.
 - One ceramic capacitor value 4.7 pF is added across Oscillator section of the new Varco.
 - Value of R17 is changed from 47 Ohms to 100 Ohms.

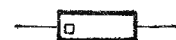
R	1.	2.	3.	4.	5.	6.	7.8.9.
C	C1a.	C1b.	2.C1c. C1d.3.4.			5.	6.
S	A.		B.C.			D.	8. 7.



TRIMMING DATA

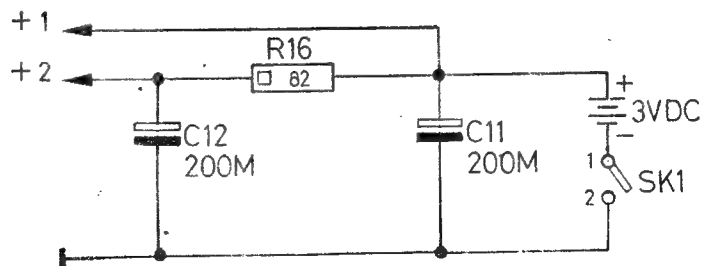
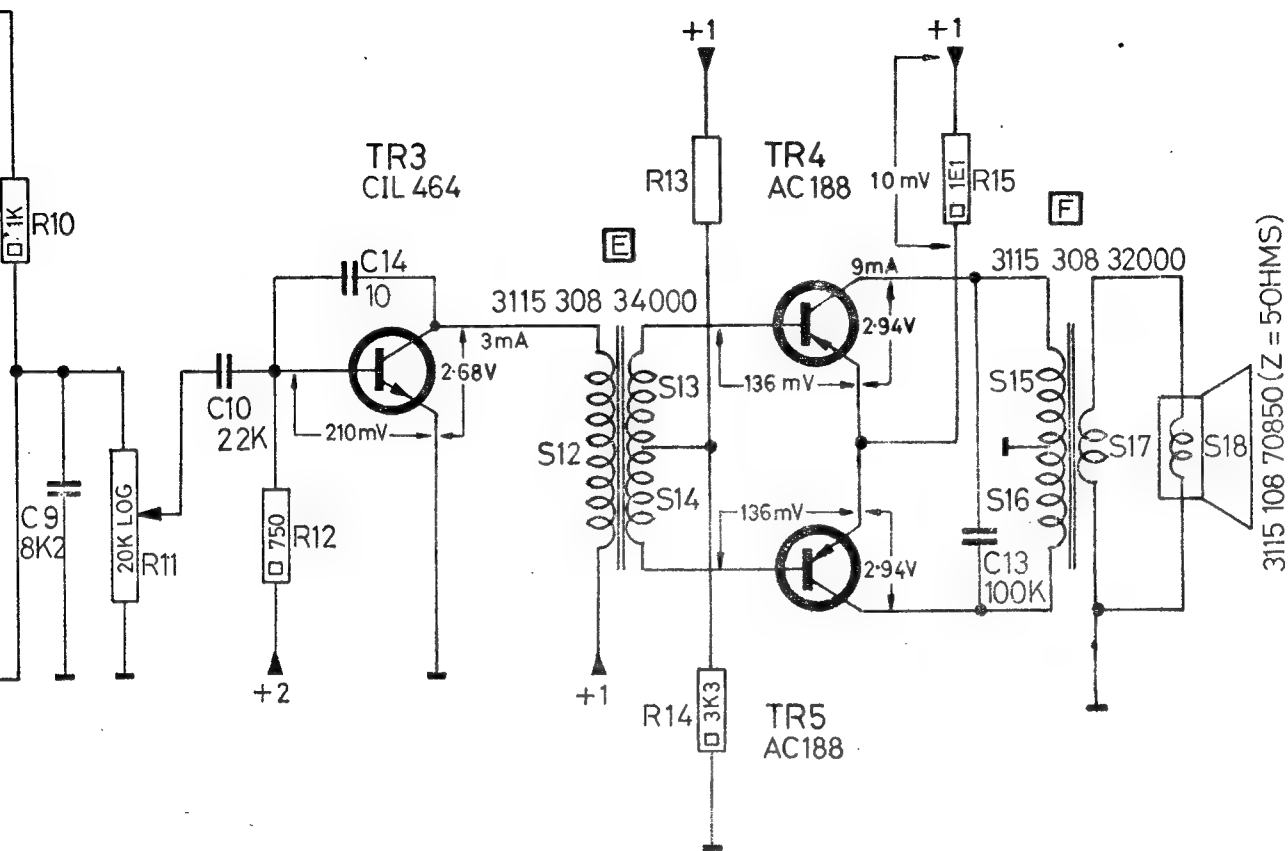
TRIMMING FREQUENCY.	ADJUST FOR MAXIMUM OUTPUT. OSILLATOR.	ANTENNA.
560KHz.	B.	A.
1500KHz.	C1d.	C1b.

NOTE 1) SK1 IS COUPL
2) THE VALUE OF



10.	11.	12.	13.14.	16	15.	R
9.	10.	14	12.	13	11.	C
			E.		F.	18.
						S

IF = 452 KHz

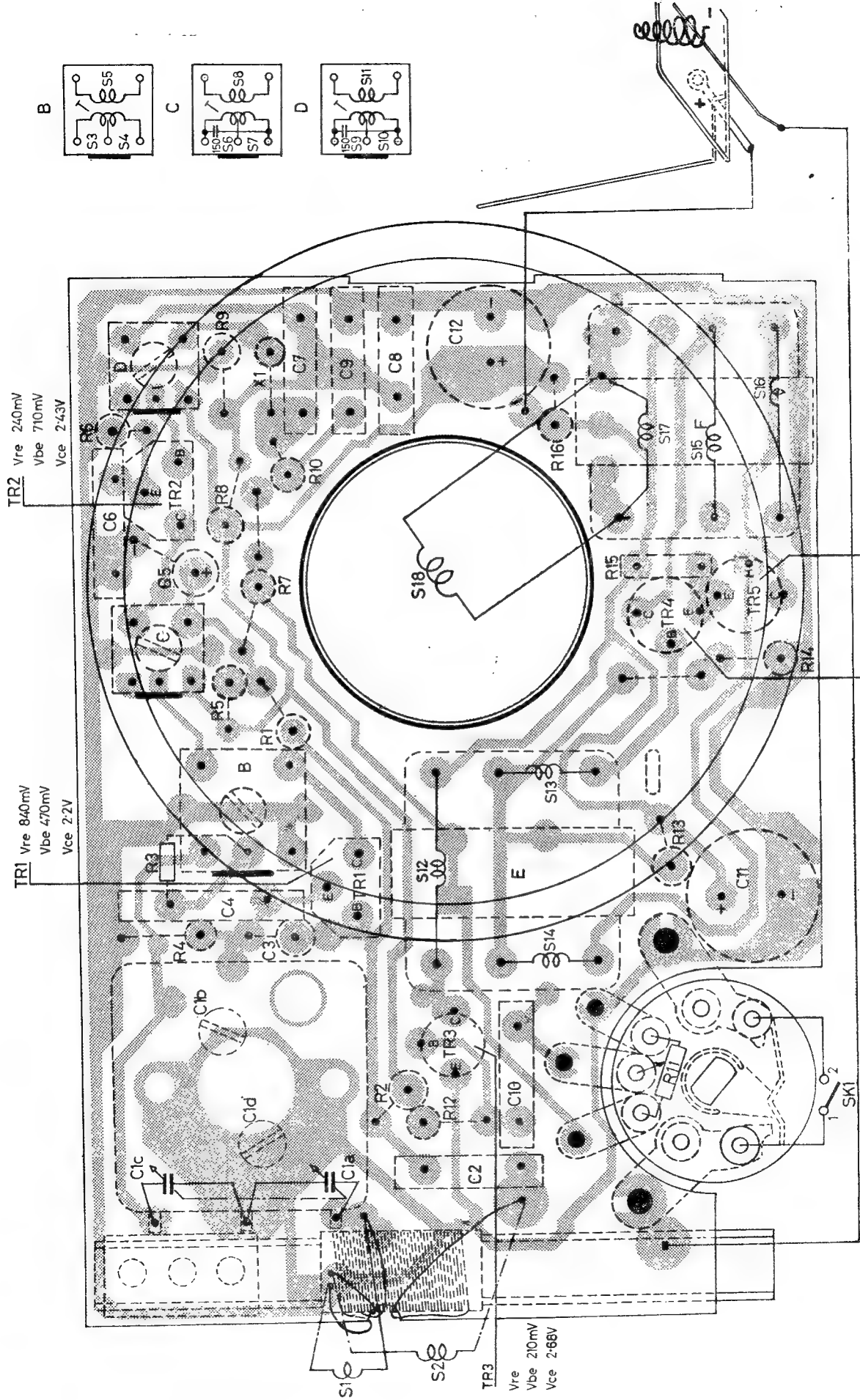


ED WITH VOLUME CONTROL R11.
R13 MUST BE SELECTED FROM 160-180-200-220 OHMS RESISTOR.

15RL 035/OOR

2315 202 32 --- $\frac{1}{8}$ WATT

R	12	2	11	4	3	13	1	5	14	6	10	16	7	8	9	12	C
C	C1a	C1c	2	C1d	10	C1b	3	4	11	E	B	C	18	F	D		C
S	1.2																S

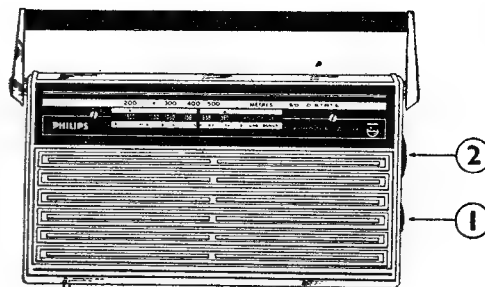


15RL 035/00R
PRINT LAYOUT



PHILIPS Service manual

RADIO 15RL129/00B



Year of release 1973

For 6 Volts Battery Supply

Waveranges

MW : 185 - 580 m (1622 - 517 KHz)

Controls

1. On/Off switch and volume control
2. Tuning

Transistors & Diodes

TR1 : BF194B
TR2 : BF195C
TR3 : BF195D
TR4 : BC148B
TR5/TR6 : AC127/AC128 (Matched pair)
D1 : OA79

Battery Type

Philips R20 or equivalent (4 × 1.5 volts cell)

Loudspeaker

2415 258 34306 (Z = 8 ohms)

Built-in-aerial

Ferroceptor is provided

Consumption

Approximately 25 mA in minimum position of volume control

TRIMMING THE RECEIVER :—

Refer circuit diagram

General

Replace the loudspeaker by 8 ohms resistor. Set the volume control to maximum.

IF Circuits

Adjust varco to minimum capacity. Apply modulated 452 KHz signal via 33000pF condenser on—

1. Base of TR2 and trim S4/S5 to maximum output.
2. Base of TR1 and trim S3 to maximum output

RF Circuits

(Refer circuit diagram for trimming data)

Adjust pointer to mark 'C' at maximum capacity position of varco. Trim with modulated signals at points B and A to maximum output as shown in trimming data.

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Front assy .	3115 108 02870	Battery contact :	
Cabinet (Back cover) .	3115 109 00971	Coil spring × 1 (Negative) .	3115 101 00170
Battery door .	3115 108 02891	Spring × 2 (Negative) .	3115 101 00180
Handle .	3115 108 02900	Battery contact × 2 (Positive) .	3115 101 60090
Dial .	3115 105 00780	Spring for vol. control knob .	3122 101 04270
Pointer .	3115 108 01721	Spring for tuning knob .	3122 993 19131
Knob (volume control) .	3115 108 03000	Nut for potmeter .	3115 101 21890
Knob (tuning) .	3115 108 01770	or	3115 200 40260
Drive cord spring .	3115 101 00220	Screw for fixing :	
Drive pulley × 3 .	3122 993 23240	Cabinet × 2 .	2522 001 07118
Pin for fixing handle .	3115 101 61010	Dial × 2 .	2515 123 88025
Aerial socket .	3115 101 60670	Varco × 2 .	2522 001 07076
Heat sink .	3322 060 03800		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
C5 (195 pF) .	2215 555 96008	C17 (400 mF) .	2215 001 12401
C7 (3600 pF) .	2015 300 96006	C18 (320 mF) .	2215 001 43321
C8 (5 MF) .	2215 001 18508	C19 (200 mF) .	2215 001 13201
C9 (1800 pF) .	2015 300 96035	R10 (5K + 17K ohms) .	2315 381 84482
C12, C13 (4700 pF) .	2215 563 01472	R14 (270 ohms) .	2115 611 00007

Circuit Description

The main stages in the set include frequency changer, two I. F. Amplifiers, detector diode, driver and output stages.

1. FREQUENCY CONVERTER :

a) D. C. Condition :

The DC condition for TR1 (BF 194B) is satisfied by base resistor R1 through S1C and the emitter resistor R2 (returned to the supply negative). The collector resistor R4 takes care of any bottoming effect on strong stations.

b) Aerial Section :

The set is fitted with a ferroceptor aerial. Normally an outdoor aerial is not needed ; but where used for weak stations, it is loosely coupled to the aerial coil by S1d.

The aerial circuit is tuned for MW by S1a/b and C2 and C1a. Here S1 and C2 are adjustable for tracking purposes. The signal from the aerial section is fed to the base of TR1 through transformer coupling via S1C.

c) Oscillator Section :

The oscillator is of the straight forward feedback type using the emitter, base tank S2 a/b-C5-C4/C1b. The feedback winding S2C is in series with the 1st IF primary. The tap on the tank circuit coil takes care of proper matching to the emitter circuit via R3-C6.

2. I. F. AMPLIFIER :

The IF signal generated by TR1 is accepted through IF transformer S3 S3 a/b, R. F. Signals being strongly attenuated by C7. The DC condition of TR2 is set by base resistor R5 stabilised by C8 by voltage divider chain and the emitter and collector are connected to lower and higher potential respectively. The amplified signal is fed to the 2nd IF transformer S4 a/b which couples to the next amplifier TR3. TR3 amplifies the IF signal and feeds to the collector via tuned transformer S5 ab/c.

3. DETECTOR :

The detector diode D1 is kept conducting by connecting its anode to suitable voltage net work. At the same time it supplies the AVC voltage to the base of TR2 via net work R10-R7/C8-R5.

4. AUDIO STAGE :

The demodulated voltage (after filtering by C12-R8/C13 is fed to the volume control R10. A physiological tone corrector C14-R9 gives bass-prominent reproduction for lower volume settings. The audio signal is fed to the base of TR4 via R11 and C16 where R11 takes care of input damping of TR4. The DC condition of TR4 is set by base resistor R12 where emitter and collector are connected to lower and higher potentials as usual. Condenser C15 between base and collector gives a negative feedback for higher tones (as well as for any residual IF).

The output audio stage contains a single-ended complimentary symmetry circuit with transformer coupling from the driver TR4. The base voltages for the output transistors are set by the potential driver R15-R16-R17-R18 and stabilised by the NTC resistor R14. The collector currents of the output transistors are adjusted by changing the values of R16 and R17. The final negative feedback from the loudspeaker point is applied to base circuit of TR4 through R13.

5. POWER SUPPLY STAGE :

The power supply section uses filter capacitor C18. A reduced voltage is applied to RF and IF stages after additional filtering by R19/C19.

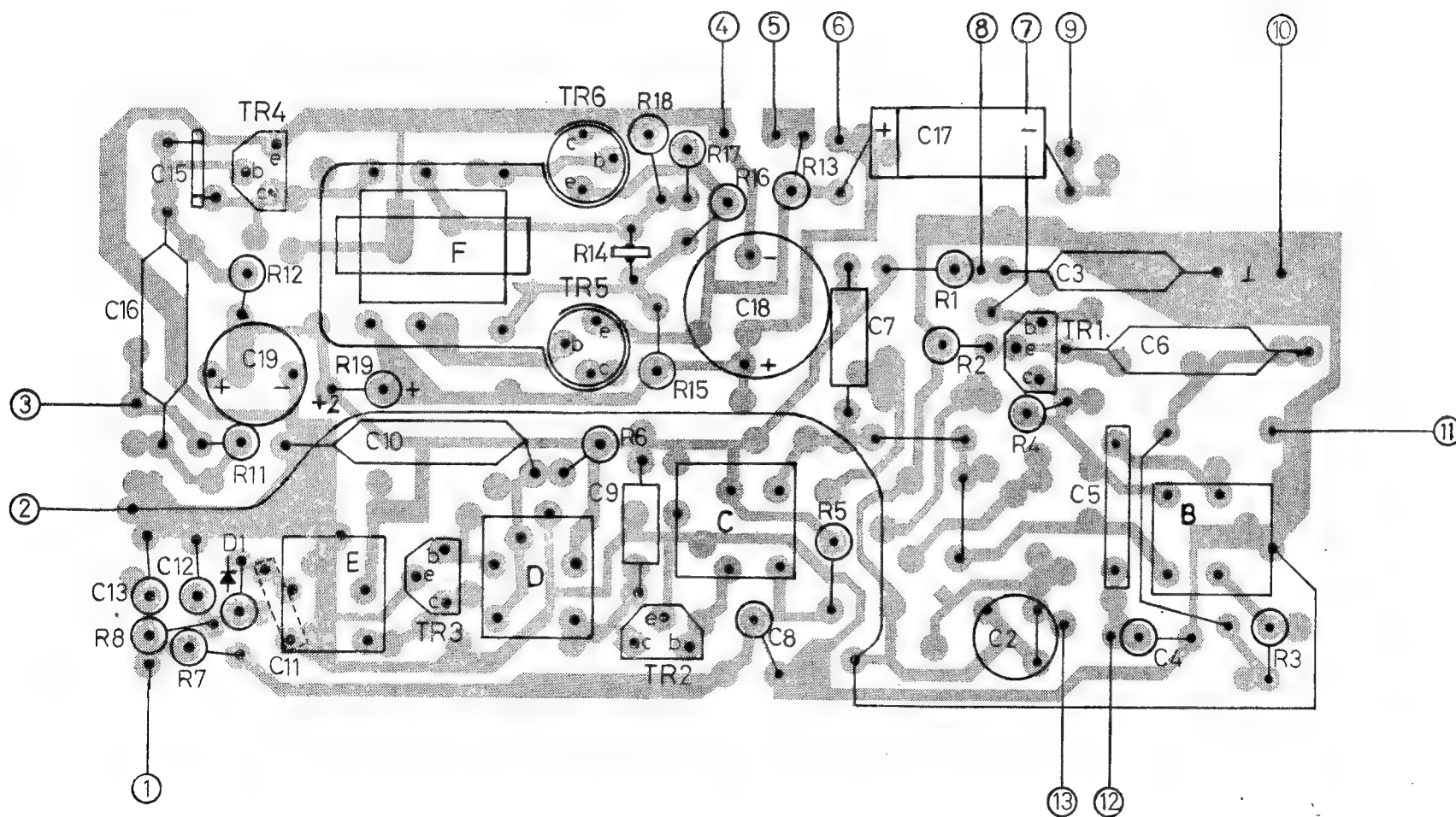
R	8.	11.	19.	14.	18.	17.	13.	1.	4.	3.	R		
R	7.	12.		6.	15.	16.	5.	2.			R		
C	13	12.	19	10.	9	18	8.	7.	17.	2.	3.	6.	C
C	16.	15.	11.								5.	4.	C

D1. TR4.

TR3.

TR5. TR6. TR2.

TR4.

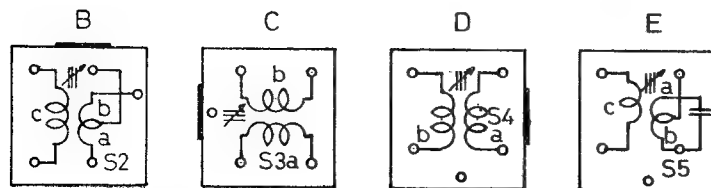
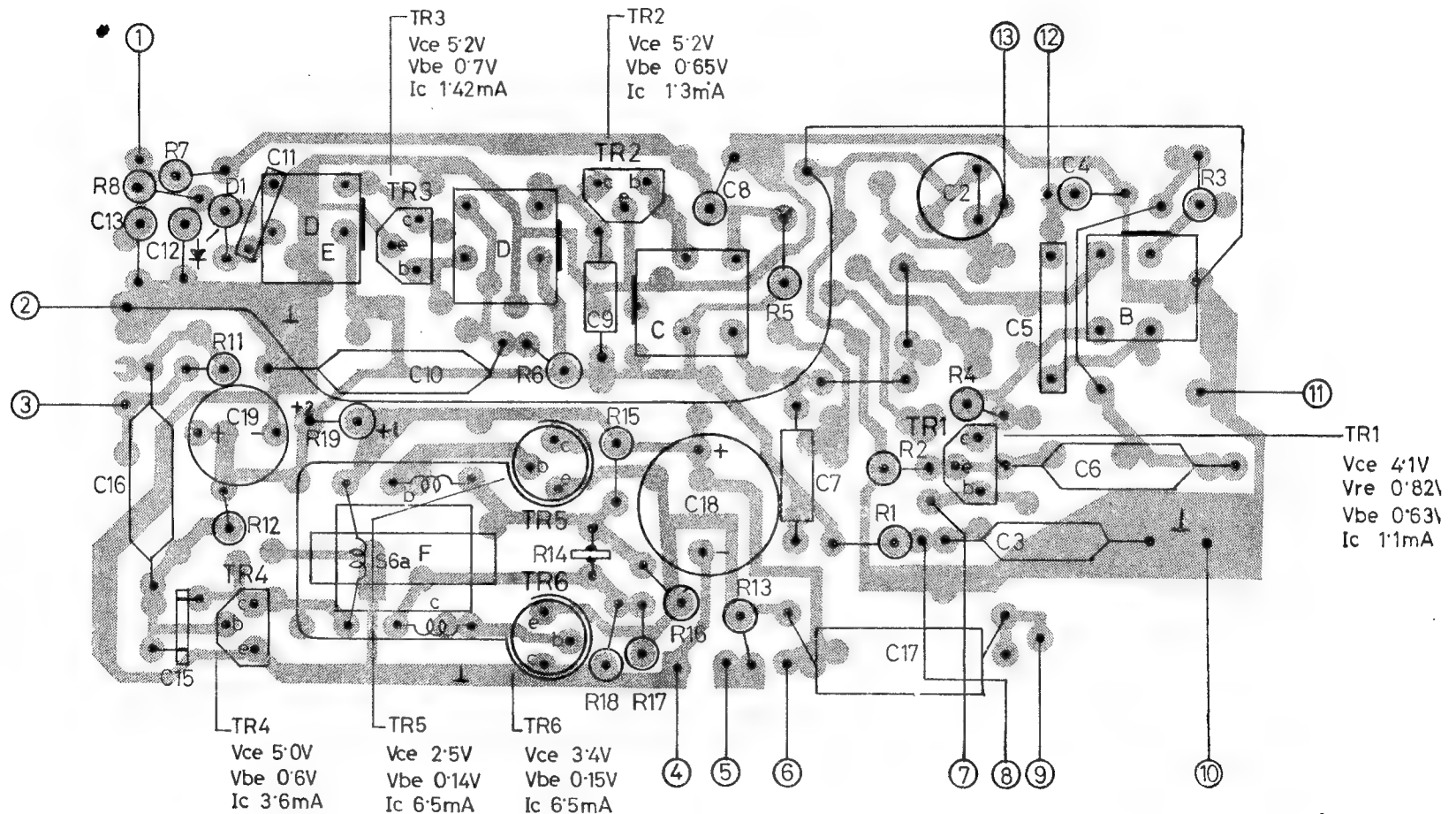


R	8.	7.	11.	12.	19.		6.	15.	16.	13.		1.	2.		3.	R
R							14.	18.	17.		5.		4.			R
C	13.	12.	19.		10.		9.		8.		7.		2.	5.	6.	C
C	16.	15.		11.					18.			17.		3.	4.	C

TR4. E. F. TR3. D. TR5. TR6. TR2. C.

TR1.

B.

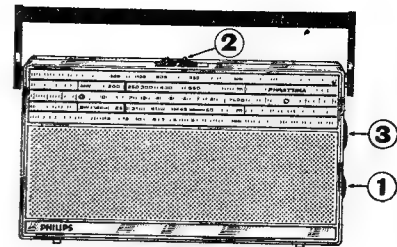


R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	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PHILIPS Service manual

RADIO 15RL211/00X/00B



Year of release 1972

For 6 Volts Battery Supply

Waveranges

MW : 185 - 580 m (1622 - 517 KHz)
SW : 19.1 - 63.22 m (15.7 - 4.65 MHz)

Controls

1. On/Off switch and volume control
2. Bandswitch
3. Tuning

Transistors and Diodes

TR1 : BF194B
TR2 : BF195C
TR3 : BF195D
TR4 : CIL464/BC148B
TR5/TR6 : AC127/AC128(pair)
X1 : OA79

Battery Type

Eveready type 1050 or equivalent (4 × 1.5 volts cell)

Built-in-aerial

Ferroceptor for MW and loop aerial for SW.

Loudspeaker

2415 258 34306 (Z=8 ohms)

Consumption

At zero signal 15 — 23 mA

Adjusting collector current of output transistors TR5/TR6

Select resistor R15 of value 62/75 ohms and R16 of value 91/110 ohms for collector current of 7 ± 2 mA. Values of R15 and R16 may be 82/91 ohms and 110/120 ohms.

TRIMMING THE RECEIVER :—

Disconnect the loudspeaker and substitute a matching resistor to 8 ohms. Set the volume control to maximum.

IF Circuits

Switch on the set to MW. Adjust varco to minimum capacity, screw out cores S9/S10, S11/S12. Apply modulated 452 KHz signal through 33 KpF condenser to :

1. Base of TR2 and trim S13/14/15 and S11/12 for maximum output.
2. Base of TR1 and trim S9/10 for maximum output.

RF Circuits

(Refer trimming data)

Adjust pointer to mark 'A' in maximum capacity position of Varco. Trim with radiated signal for maximum output at frequencies as shown in trimming data:

- (a) MW at B and C
- (b) SW at D and E

Note : Adjust the location of loop S20A for maximum output and seal as shown in loop wiring diagram.

15RL211/00X

MECHANICAL PARTS

Description	Code Number	Description	Code Number
Front assy	3115 108 02591	Square nut for cabinet for fixing screw × 2	3115 101 22090
Cabinet assy	3115 109 00651	Heat sink	3115 108 01801
Battery door	3115 108 02531	Battery contact positive × 3 .	3115 101 60090
Handle	3115 108 02581	Battery contact negative × 2 .	3115 101 00180
Dial	3115 105 00741	Battery spring (coil)	3115 101 00170
Dial shade	3115 104 03020	Aerial socket	3115 101 60670
Pointer	3115 100 02571	Washer for handle × 2	3115 104 03520
Knob (tuning)	3115 100 02491	Washer for dial × 2	3115 200 40060
Knob (volume control) . .	3115 108 02520	Bracket for fixing tuning knob	3115 108 02510
Knob (band switch) . . .	3115 104 03000	Retaining ring for pulley × 3 .	2522 634 04002
Varco drum assy	3115 105 02560	Retaining ring for tuning pulley	2522 634 04005
Drum pulley × 3	3122 993 23240	Spring for volume control knob	3122 101 04270
Ornamental strip	3115 105 10690	Eyelet for drive cord × 2 . .	2522 642 08129
Ornamental strip (MW) . .	2115 105 10710	Screws for fixing : Cabinet × 2	2522 017 09094
Ornamental strip (SW) . .	3115 105 10700	Dial × 2	3115 200 40180
Spring for drive cord . .	3115 101 00220	Loudspeaker & bandswitch × 5	2515 123 89002
Bandswitch	3115 108 40560	Bandswitch knob	2515 123 89027
Nut for fixing volume control	3115 101 21890	Varco bracket × 2	2515 123 89003
Varco drum	3115 104 02970	Varco × 2	2522 001 07076
Spring for fixing drum . .	3122 993 19130		
Grommet for varco bracket .	2422 015 09035		
Bracket for loudspeaker × 3	3115 101 21470		
Grommet for ferroceptor .	2422 015 09043		

ELECTRICAL PARTS

Part Number	Code Number	Part Number	Code Number
S20A/B (2.5metre)	0722 172 00006	C11 (3K0 pF)	2015 361 33902
R11 (17K+5K ohms)	2315 381 74482	C12 (3K6 pF)	2015 361 33602
R18 (270 ohms)	2115 611 00007	C13 (5 MF)	2222 001 18508
C1, C2 (25 pF)	2215 551 00013	C14 (1K8 pF)	2015 361 31802
C7 (3K9 pF)	2215 563 02392	C17, C18 (4K7 pF)	2215 563 02472
C8 (50 pF)	2215 551 00014	C22 (400 MF)	2222 001 12401
C9 (20 pF)	2215 808 00006	C23 (320 MF)	2222 001 43321
C10 (430 pF)	2015 361 34301	C24 (200 MF)	2222 001 43201

PARTS LIST FOR 15RL211/00B

This receiver is similar to 15RL211/00X except for the following parts :

Description	Code Number
Front assy	3115 101 02601
Cabinet assy	3115 109 00648
Battery door	3115 108 02611
Dial	3115 105 00731

CIRCUIT DESCRIPTION

The main stages in the set include frequency changer, two IF amplifiers, detector diode, driver and output stages. Band selection is achieved by changeover contacts of a slide switch.

1. Frequency Converter

(a) DC Condition

The simplified diagrams for the two bands are given in figure for RF circuits. The DC conditions for TR1 (BF194B) are satisfied by base resistor R1 established by C5, and emitter resistor R2 (returned to a lower potential). The collector resistor R3 takes care of bottoming effect on strong local stations.

(b) Aerial Section

The set is fitted with a ferroceptor aerial for medium wave and a frame aerial for short wave. Normally an outdoor aerial is not needed, but where used for very weak stations, it can be directly connected.

The aerial circuit is tuned for medium wave by S1-C2/C3. Here S1 and C2 are adjustable for tracking purposes. The aerial circuit on the SW band is tuned by S20A-C1/C3. The distance between S20A and S20B, and C1 are adjustable for tracking.

(c) Oscillator Section

The oscillator is of the straightforward feedback type using the tank (S3/S4-C10-C8/C4 for medium wave and S6/S7-C11-C9/C4 for short wave) between emitter and base. The tap on the tank circuit coils takes care of proper matching to emitter through R4-C6 for medium wave and C7/C6 for short wave.

2. IF Amplifiers

The IF signal generated by TR1 is accepted through IF transformer S9-S10 by proper load matching, RF signals being strongly attenuated by C12. The DC condition for TR2 is set by base resistor R5 stabilised by C13; and the emitter and the collector are connected to lower and higher potential respectively. The amplified signal is fed to the IF transformer S11-S12 to feed to the next amplifier TR3, which again feeds the amplified signal to the last tuned transformer S13/14-S15.

3. Detector

The detector diode X1 is kept conducting because its anode is connected via R9 to a positive point on the voltage divider of R5-R7-R11. AGC voltage is applied to the base of TR2 for strong signals via R7-R5/C13.

4. Audio Stage

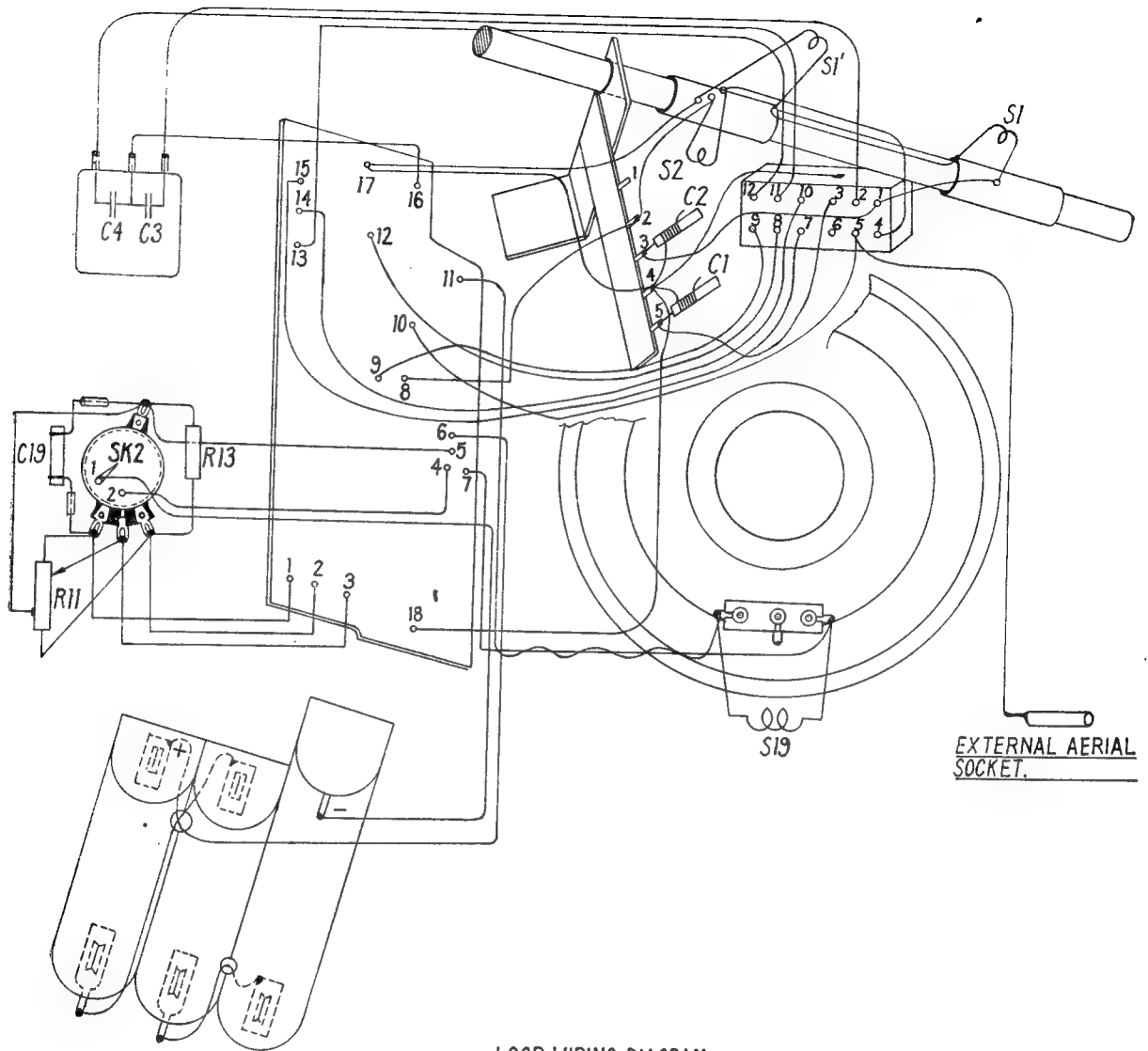
The demodulated voltage (after filtering by C17-R9-C18) is fed to the volume control R11. A slight high tone boost is applied by C19 for lower volume settings.

The DC conditions of TR4 are set by base resistor R10 where emitter and collector are connected to lower and higher potentials as usual. The addition of R12 in series with the coupling condenser C21 from volume control reduces the input damping of TR4 for a satisfactory volume control operation. Condenser C20 between base and collector gives an AC negative feedback for higher tones.

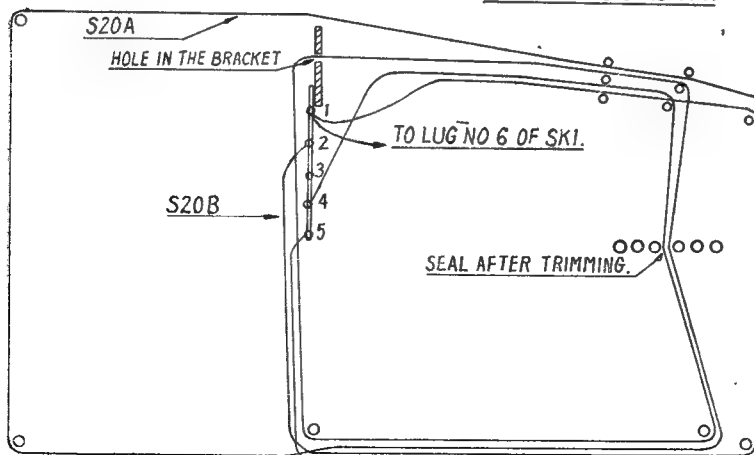
The output audio stage contains a single-ended complimentary-symmetry circuit with transformer coupling from the driver TR4. The base voltages for the output transistors are set by the potential divider chain R14, R15, R16 and C17 and stabilised by the NTC resistor R18. The collector current is adjusted by changing the values of R15 and R16 (see technical data). A final negative feedback from the loudspeaker point is applied to the base of TR4 through R19-R13.

The power section uses filter capacitor C23, and a reduced voltage is supplied to RF and IF stages after additional filtering by R20/C24.

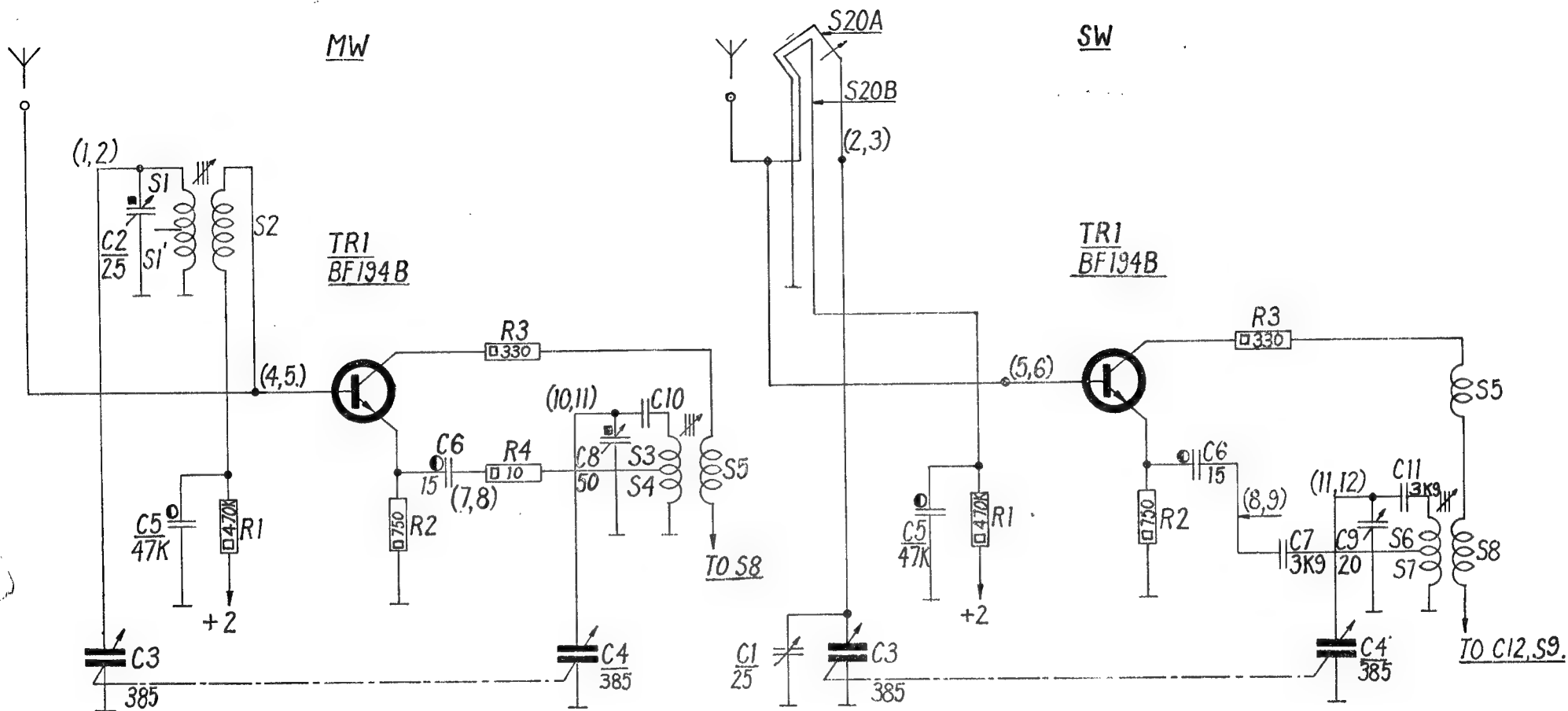
R: 11, 13,
 C: 19, 4, 3,
 S: 2, 1,
 S2, 19, S1', S1.



LOOP WIRING DIAGRAM.



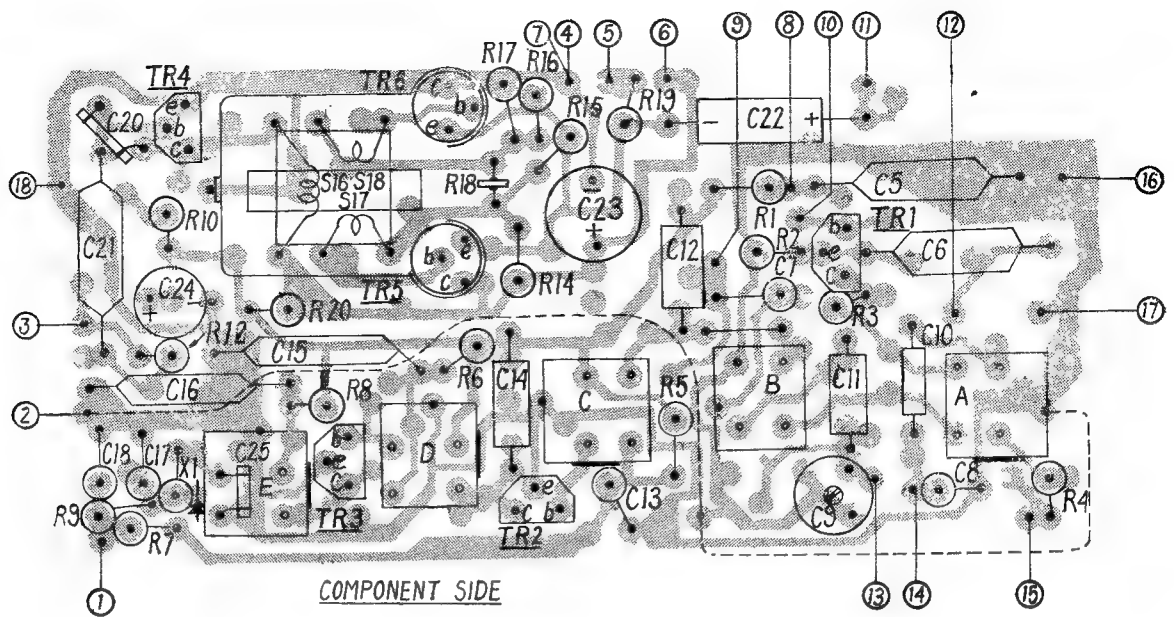
15RL 211/00X



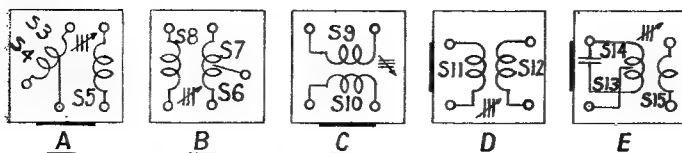
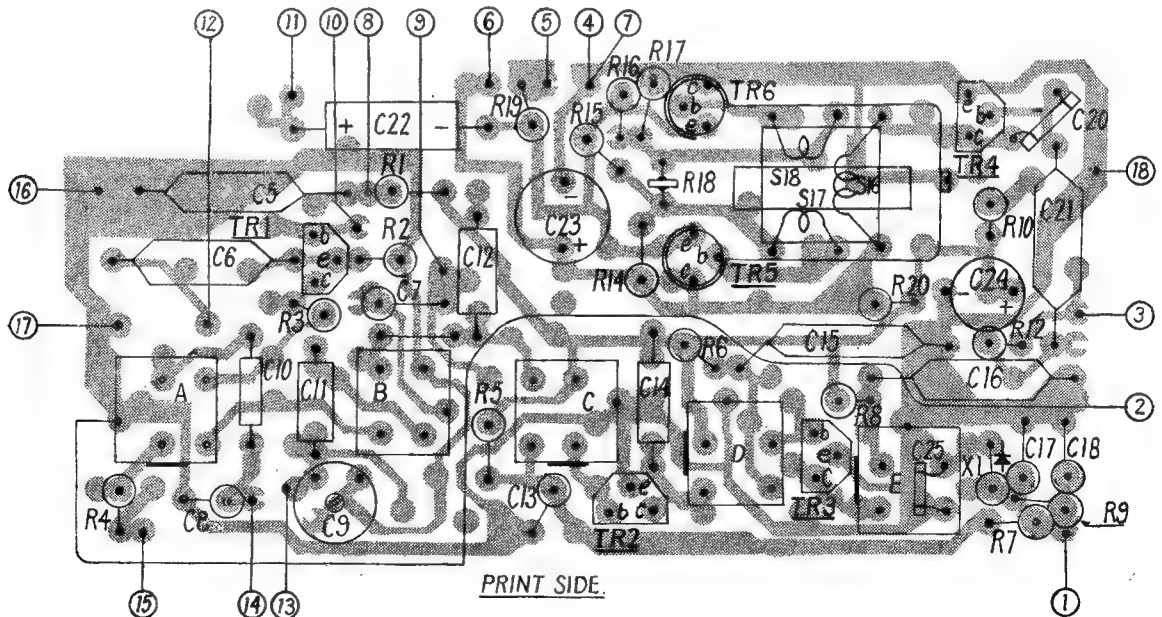
NOTE:- NUMBERS IN BRACKETS INDICATE SHORTING CONTACTS OF BANDSWITCH

15RL 211/00X

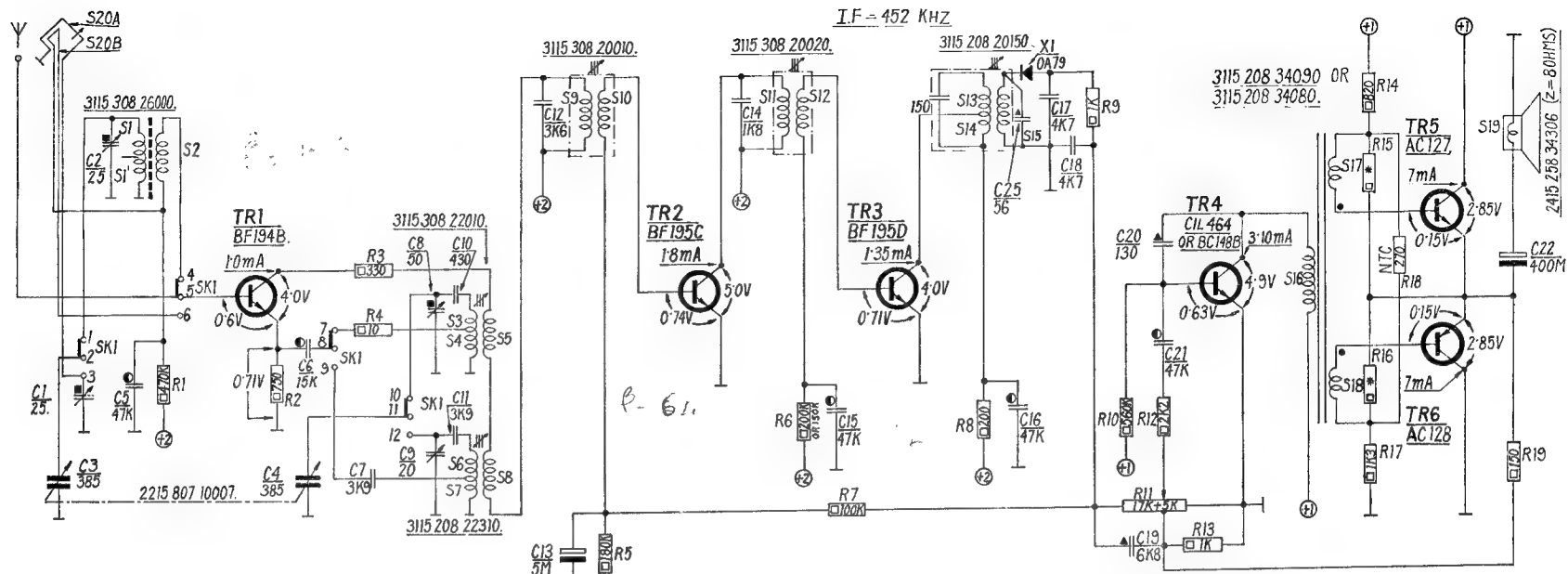
R:	9,	7, 10, 12,	20, 8,	18, 6, 17, 16, 14, 15,	19, 5,	1, 2,	3,	4.
C:	21, 18, 20, 17, 24, 16, 25,	15,		14,	23, 13, 12,	22, 7, 9, 11,	5,	6, 10, 8.
S:		E,	D,	C,		B,		A.



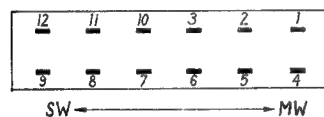
R:	4,	3,	1, 2,	5, 19,	15,	16, 14, 17, 18, 6,	8,	20	7, 10, 12,	9.
C:		8, 6,	5, 10, 11,	9,	22, 7,	12, 13, 23,	14,	15,	25,	16, 24, 17, 21, 20, 18.
S:		A,		B,		C,	D,		E.	



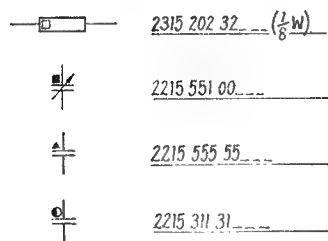
15RL 211/00X



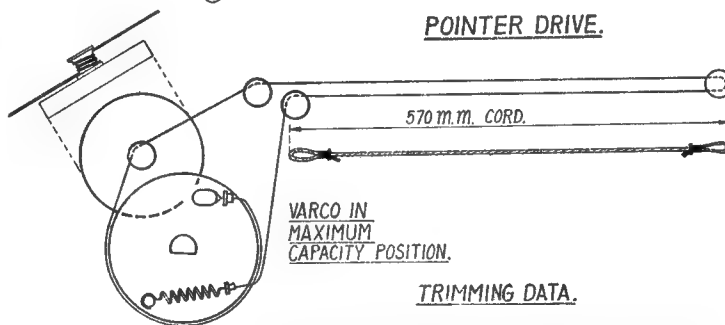
BANDSWITCH SKI



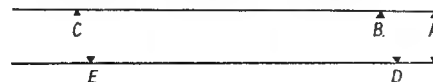
SYMBOLS.



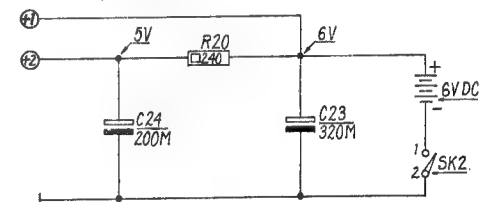
POINTER DRIVE.



WAVE BAND	TRIMMING FREQUENCY	POINTER SETTING AT	TRIM FOR MAXIMUM OUTPUT
MW	560KHZ.	B	S3,4,5, S1, S2.
	1500KHZ.	C	C8, C2.
		REPEAT.	
SW	5MHZ.	D	S6, 7, 8, S20A.
	14.3MHZ	E	C3, C1.
	9.97MHZ	TUNED	C1



- * R15 62/75 OHMS.
♦ R16 91/110 OHMS.



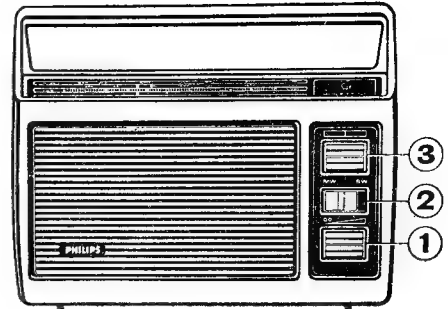
NOTE: SK2 IS COUPLED WITH VOLUME CONTROL R11

15RL 211/00X.



PHILIPS Service manual

RADIO 15RL221/00B/01B



Year of release 1973

For 6 Volts Battery Supply

Waverange :

MW : 185 - 580 m (1622 - 517 MHz)
SW : 66.6 - 19 m (4.5 - 16.0 MHz)

Controls :

1. On/Off switch and volume control (R 12)
2. Wave band selector switch.
3. Tuning.

Transistors and diodes :

TR1 : BF 194B
TR2 : BF 195C
TR3 : BF 195D
TR4 : BC 148C/CL1464
TR5/TR6 : AC 127/AC 128 (matched pair)
D1 : OA 79

Battery Type :

4 x 1.5 volts cells type R20.
Socket with switch for battery eliminator connection is provided.

Built-in-aerials :

Ferroceptor for MW and internal loop for SW.

Loudspeaker type :

2415 257 34306 (Z=8 ohms)

Consumption :

Approx. 18 to 24 mA at minimum position of volume control.

Adjustment of collector current of output transistors :

Select values for resistors R17/R18 as given in note below
Circuit diagram for the corresponding pairs.

Collector current is 7 ± 2 mA (at 25°C).

Trimming the receiver :

Refer to circuit diagram.

General :

Connect a suitable resistor of 8 ohms in place of loudspeaker.
Adjust the volume control to maximum position.

I. F. Circuits :

Adjust varco to maximum position. Switch on the receiver to MW. Screw out cores of coil S5 and S6. Apply a modulated signal of 452 KHz through 33 KpF condenser to

(1) Base of TR2 and trim S7 and S6 to maximum output.

(2) Base of TR1 and trim S5 to maximum output.

H. F. Circuits :

Adjust the pointer to ∇ (mark on frame) on the extreme right side of the receiver in maximum capacity position of varco. Apply modulated RF signal via loop and trim for maximum output at frequencies shown in trimming data.

Note : MW oscillator frequency = Tuning frequency + I.F.
SW oscillator frequency = $1/2$ (Tuning frequency + I.F.)

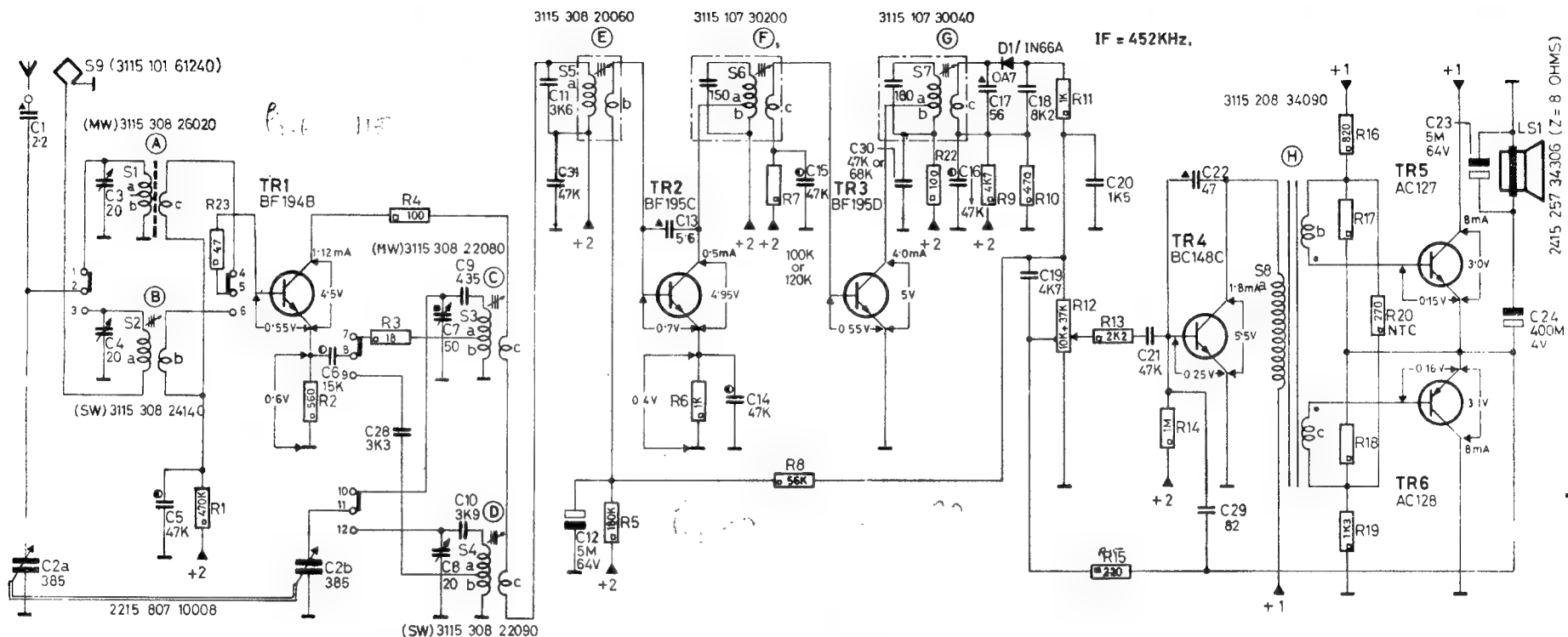
MECHANICAL PARTS

Description	Code No.	Description	Code No.
Front assy. ..	3115 109 00951	Bracket for fixing dial ..	3115 104 05160
Back cover assy. ..	3115 109 00931	Tuning spindle ..	3115 101 22400
Frame assy. (centre section) ..	3115 109 00941	Bracket for fixing loudspeaker ..	3115 201 21110
Battery lid ..	3115 109 00911	Eyelet on drive cord ..	3115 101 61210
Dial ..	3115 105 00801	Screw for fixing : Back cover x 2 ..	3115 105 10840
Pointer ..	3115 109 01301	Centre frame section x 3 ..	2515 123 88002
Knob (Volume Control) ..	3115 104 03700	Centre frame section ..	2515 123 88004
Knob (Tuning) ..	3115 104 03710	Bandswitch ..	2522 017 13093
Knob (Band change) ..	3115 104 03680	Gearwheel ..	2522 001 07076
Wave range switch ..	3115 108 40580	Printed board ..	2515 123 89002
Drum for varco ..	3115 104 03690	Battery eliminator socket ..	2515 123 89001
Gear wheel varco ..	3115 104 03670	Varco bracket ..	2515 123 89003
Drive pulley (nylon) ..	3115 104 01900	Loudspeaker ..	2515 123 89002
Drive pulley (above nylon pulley) ..	3115 201 60810	Ring for fixing : Band change knob ..	3115 101 00350
Drive pulley ..	3122 993 23240	Volume control knob ..	3122 100 40770
Spring for drive cord ..	3115 101 00470	Tuning knob ..	2522 634 04004
Nut for potmeter fixing ..	3115 101 21890	Drive pulley ..	2522 634 04003
Bracket for fixing varco ..	3115 109 00921	Washer for fixing : Back cover (paper) ..	4304 073 00140
Grommet for fixing varco bracket ..	2422 015 09035	Back cover ..	2515 600 17016
Spacer for fixing varco bracket ..	3115 100 40410	Centre frame section ..	2522 600 17017
Heat sink assy. ..	3115 108 02830	Varco bracket ..	2515 600 24014
Battery contact (+ve) x 2 ..	3115 100 20100	Tuning spindle (plastic) ..	3115 104 04090
Battery spring (-ve) coil type ..	3115 101 00570	Printed board ..	2522 600 24017
Battery contact (-ve) ..	3115 101 00180		
Battery eliminator socket assy. ..	3115 108 50680		

ELECTRICAL PARTS

Part Location No.	Code No.	Part Location No.	Code No.
Polyco : C5, 14, 15, 16, 21, 31 ..	(47K) 2215 311 31473	Styroflex : C-11 ..	(3K6) 2015 300 96014
C-30 ..	(47K) or 2215 311 31473 or	Ceramic Tubular : C-13 ..	(5.6pF) 2215 607 08568 or
Foil Trimmer : C3, 4, 8 ..	(68K) 2215 311 30683		2215 555 08568
	(20pF) 2215 807 00006 or	Ceramic Tubular : C-17 ..	(56pF) 2215 607 56569
	2215 808 00006 or	Ceramic Pinup : C-18 ..	(8K2) 2215 565 01822
	2015 808 00103	C-20 ..	(1K5) 2215 563 02152
Ceramic Tubular C-1 ..	(2.2pF) 2215 607 08228 or	Ceramic C-29 ..	(82pF) 2215 607 55829
	2215 555 08228	Ceramic Pinup : C-19 ..	(4K7) 2215 565 03472
Ceramic Tubular-C-22 ..	(47pF) 2215 607 56479	Plate Ceramic : C-27 ..	(100K) 2015 629 01104
Varco : C-2a, b ..	(385pF) 2215 807 10008	Elco : C-12 ..	(5M) 2215 001 18508
Polyco : C-6 ..	(15K) 2215 311 31153	C-23 ..	(5M) 2215 001 18508
Ceramic pinup C-28 ..	(3K3) 2215 565 03332	C-24 ..	(400M) 2215 001 12401
Styroflex : C-9 ..	(435pF) 2015 300 96046 or	C-26 ..	(320M) 2215 001 90021
	2015 361 34351	C-25 ..	(470M) 2215 016 13471
Wire Trimmer C-7 ..	(50pF) 2015 551 00014	Resistors : R-12 (10K + 37K) ..	2315 381 84586
Styroflex : C-10 ..	(3K9) 2015 300 96007 or	R-20 (270 ohms) NTC ..	2115 611 00007
	2015 361 33902		

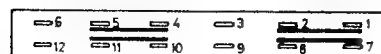
R	1. 23.			2.	3. 4.	5. 6.		7. 8.	22.	9.	10.	11.12. 13.	14. 15. 21.	16.17.18.19.20.			R				
C	1. 2a.	3. 4.	5.	6. 2b.	28.	7. 8. 9. 10.	11. 12. 31.	13.	14.	15.	30.	16. 17.	18. 19.	27. 20.	21.	26. 22.	29.	25.	23.	24.	C
M	S9.	A. B.				C. D.	E.		F.			G.	D1.			H.				LS1.	M



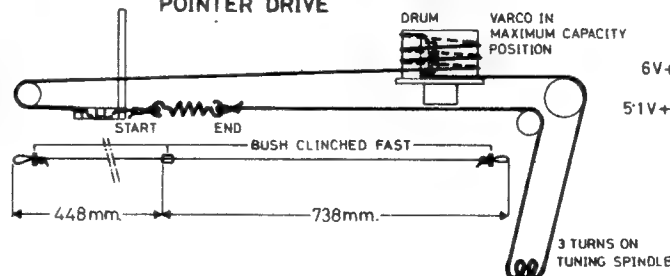
TRIMMING DATA

SR NO	TRIMMING FREQUENCY	POINT AT	TRIM FOR MAXIMUM OUTPUT OSCILLATOR	ANTENNA
1	512 KHz	MAX	C	
2	1636 KHz	MIN	C7	
3	560 KHz	TUNE		A
4	1500 KHz	TUNE		C3
5	REPEAT 1 TO 4			
6	4.5 MHz	MAX	D	
7	16.0 MHz	MIN	C8	
8	5.0 MHz	TUNE		B
9	14.9 MHz	TUNE		C4
10	REPEAT 6 TO 9			

WAVERANGE SWITCH SW → MW



POINTER DRIVE



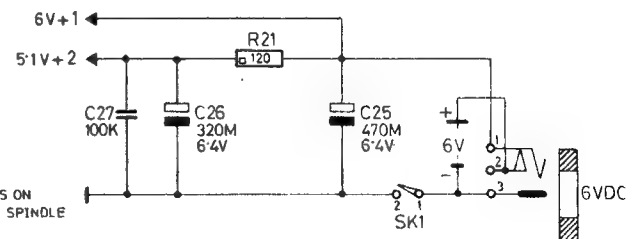
NOTE:-

SK1 IS COUPLED WITH VOLUME CONTROL R12.

R17 = 82 OHMS - R18 = 110 OHMS FOR 'T' AND 'U' PAIRS OF AC 127/128.

R17 = 91 OHMS - R18 = 120 OHMS FOR 'W' 'X' AND 'Y' PAIRS OF AC 127/128.

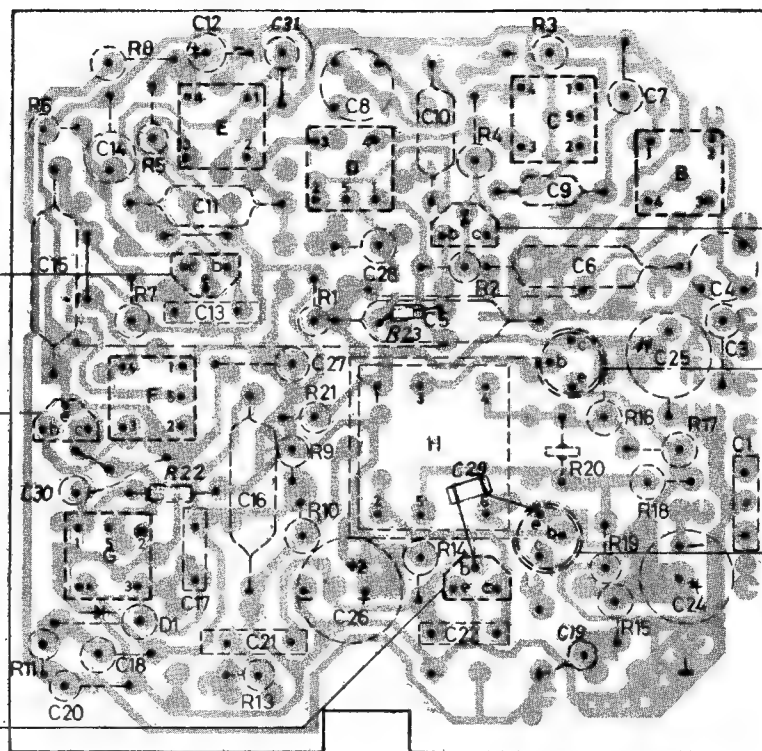
CONDENSERS VALUE IN P.F.S., RESISTORS VALUE IN OHMS UNLESS OTHERWISE SPECIFIED.



SYMBOLS

2215 555 55 --- CERAMIC	2215 311 31 --- POLYESTER
2215 551 00 --- WIREWOUND	2215 202 32 --- 1/8 WATT.

R	6.	11.	8.7.5.22.	13.	9.10.21.1.23	14.	4.2.	3.	20.	19.16.15.18.17	R
C	30	15.20.	14.18.	17.12.11.13.16.21.31	27.8.26.28.	10.5.22.29.	9.19.6.	7.24.25.3.1.			C
M			G.	F. D1.	E.	D.	H.	C.	B.		M



TR2
 $V_{ce} = 4.95V$
 $I_c = 0.5mA$
 $V_{be} = 0.7V$
 $V_{re} = 0.4V$

TR3
 $V_{ce} = 5V$
 $I_c = 4.0mA$
 $V_{be} = 0.55V$

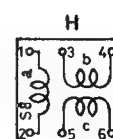
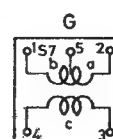
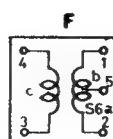
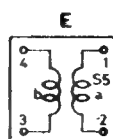
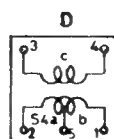
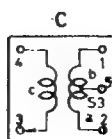
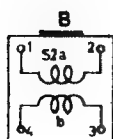
TR4
 $V_{ce} = 5.5V$
 $I_c = 1.8mA$
 $V_{be} = 0.25V$

TR1
 $V_{ce} = 4.5V$
 $I_c = 1.12mA$
 $V_{be} = 0.55V$
 $V_{re} = 0.6V$

TR5
 $V_{ce} = 3.0V$
 $V_{be} = 0.15V$
 $I_c = 8mA$

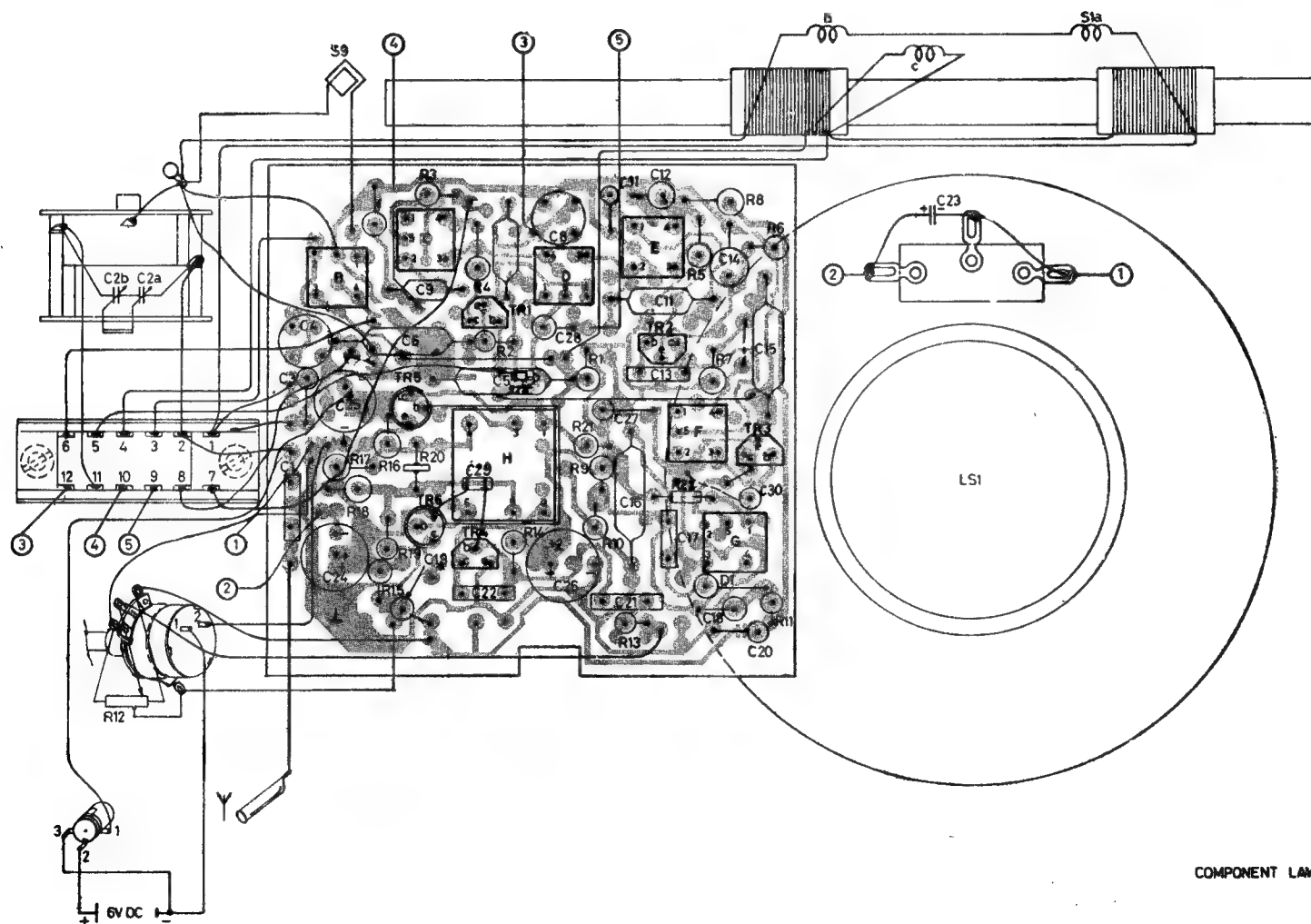
TR6
 $V_c = 3.1V$
 $I_c = 8mA$
 $V_{be} = 0.16V$

PRINT LAYOUT



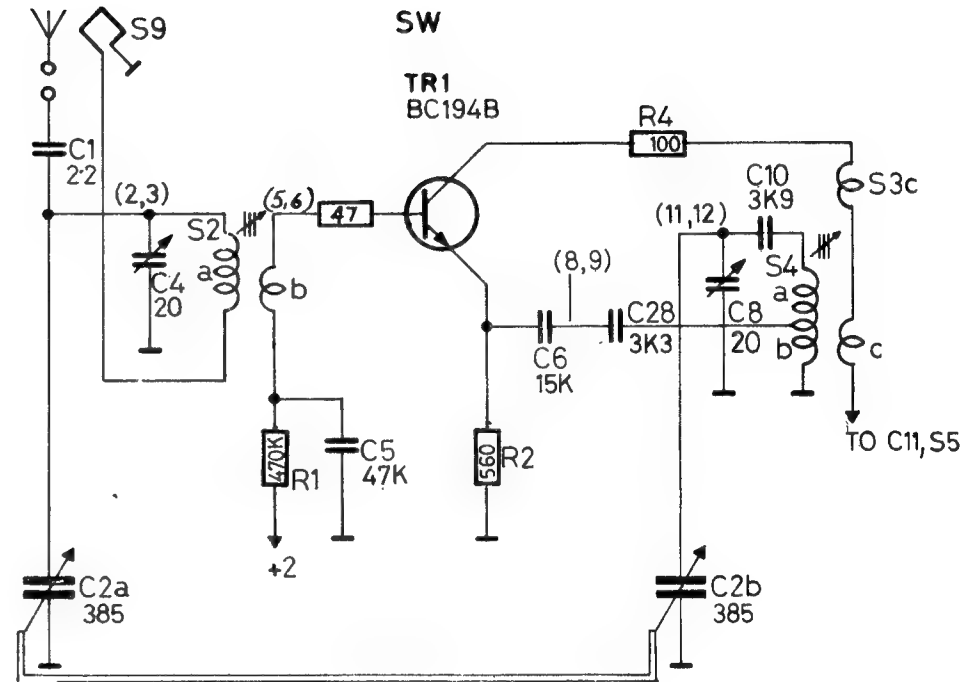
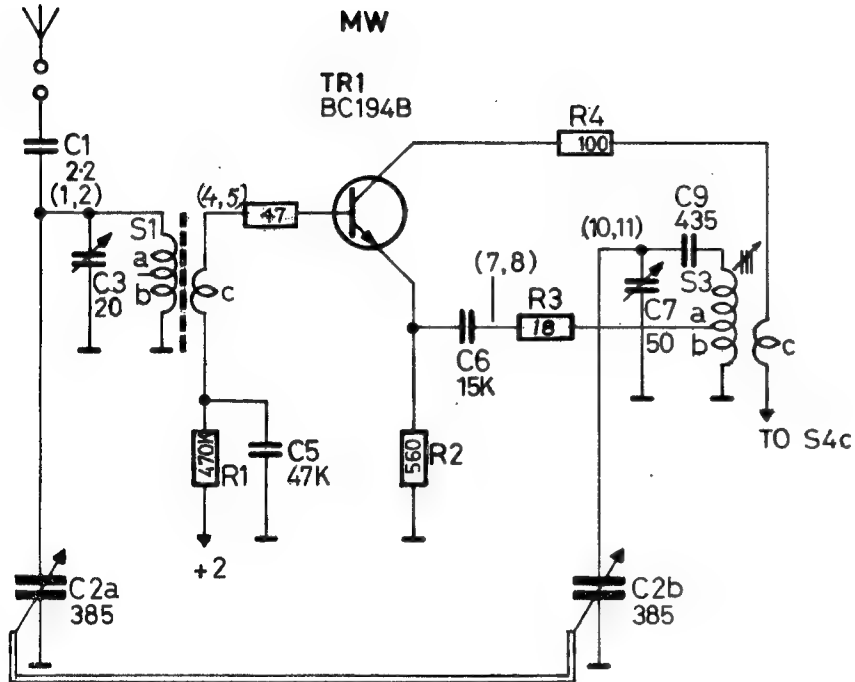
15RL 221/00B

R	12.	17.	15.	19.	3.	4.	2.	14.	9.	1.	13.	5.	7.	8.	11.	R
R		18.	16.	20.		23.		21.	10.		22.					R
C	2b.	2a.	1.	4.	24.	7.	6.	9.	29.	10.	8.	16.	31.	12.	11.	C
C			3.		25.		19.		22.	5.	26.	28.	21.	27.	13.	C
M			S9.			TR5.	TR6.	TR4.	TR1.		TR2.		D1.	TR3.	b.	M
			B.			C.		H.	D.		E.	F.	G.			
															LS1.	51a.



COMPONENT LAYOUT

RF CIRCUITS

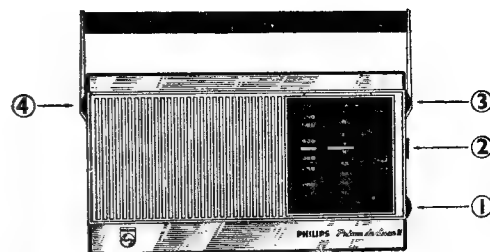


15RL 221/00B



PHILIPS Service manual

RADIO 15RL311/00B/00S



Year of release 1971

For 6 Volts Battery Supply

Waveranges

MW : 185. - 580 m (1622 - 517 Kc/s)

SW : 18.75 - 65.2 m (15.6 - 4.6 Mc/s)

Controls

- (1) On/Off switch and volume control
- (2) Waverange selection switch
- (3) Tuning
- (4) Fine Tuning

Transistors and Diodes

TR1 : BF194B

TR2 : BF195C

TR3 : BF195D

TR4 : CIL 464/BC 149C/BC 148C

TR5/TR6 : AC 127/AC 128 (matched pair)

X1, X2 : OA 79

Battery Type

6 volts (4 × 1.5 volts cell type Eveready1050 or equivalent)

Consumption

15 - 22 mA at minimum volume control position

Loudspeaker

2415 258 34306 (Z = 8 ohms)

Built-in-aerial

A built-in-loop aerial for SW and ferroceptor for MW band are provided

Adjustment of collector current of output transistors TR5 and TR6

Adjust volume control to minimum position. Include a milliammeter (Range 25 mA - DC)

between the collector lead of TR5 and positive terminal of 6 volts supply after disconnecting collector lead of TR5. Adjust the current to 7 ± 1 mA by choosing proper values for resistors R17/R18.

Approximate value for (a) R17 is 56/68 ohms and (b) R1 is 82/100 ohms.

TRIMMING THE RECEIVER :-

Refer circuit diagram for trimming data

General

Connect an 8 ohms resistor in place of speaker. Set volume control to maximum. Connect an output meter across resistor load. Apply minimum possible signal while trimming.

IF Circuits

Switch on the set to MW. Set gang condenser to maximum capacity. Screw out cores of S11/12, S14/15 as far as possible. Apply 452 Kc/s modulated signal via 33 KpF Capacitor to (a) Base of TR2 and trim S16/18 and S14/15 for maximum output (b) Base of TR1 and trim S11/12 for maximum output.

Note : MW Oscillator Frequency = Tuning Frequency + IF.
SW Oscillator Frequency = Tuning Frequency + IF.

RF Circuits

Set the gang condenser to maximum capacity. Adjust the pointer to the topmost notch behind the dial scale on front assy (A). Turn volume control to maximum. Apply modulated RF signal via loop and trim for maximum output at frequencies as shown in trimming data on (a) MW at B and C, (b) SW at D and E.

Note : To remove dial, insert a flat metal piece of about 2cm width × 1 mm thick between front of the cabinet and dial top. Press and slide the dial.

15RL311/00B

MECHANICAL PARTS

Description	Code No.
Front assy (cabinet)	... 3115 109 00531
Back shell (cabinet)	... 3115 109 00541
Battery door	... 3115 108 02401
Handle	... 3115 108 01982
Knob (Tuning)	... 3115 108 70731
Knob (Fine tuning)	... 3115 108 02081
Knob (Volume control)	... 3115 108 70741
Knob (Band switch)	... 3115 104 01351
Dial	... 3115 105 00611
Pointer	... 3115 104 02771
Band switch	... 3115 108 40211
Slide for band switch	... 3115 103 30321
Lever for band switch	... 3115 104 01341
Plate assy for band switch movement	... 3115 108 01401
Battery contact (Positive) × 3	... 3115 100 20101
Battery contact (Negative) × 3	... 3115 101 00181
Drum for varco	... 3115 104 01411
Drive pulley × 3	... 3115 201 60161
Heat Sink	... 3115 108 01821
Flat Spring to hold band change knob	... 3115 101 00201
Side bracket for Handle	... 3115 109 01361
Spring to fix handle × 2	... 3122 101 07191
Ring to fix handle (outside) × 2	... 3115 104 02821
Ring to fix handle (inside) × 2	... 3122 104 27121
Spring for drive-cord	... 3122 101 06981
Socket (aerial)	... 3115 101 60671
Grommet for fixing printed board × 4	... 2422 015 09035
Tuning Spindle	... 3115 101 60991
Bracket in front assy to fix back shell × 2	... 3115 101 60841
Spring for fixing knob	... 3122 101 04271
Ornamental strip (top)	... 3115 105 10481
do (bottom)	... 3115 105 10471
Nut for fixing potmeters	... 3115 101 21891
Spring for fixing dial	... 3115 101 60961

Description	Code No.
-------------	----------

Screws for fixing :—

Back shell to front assy × 2	... 2522 017 09093
Printed board × 4	... 2515 123 89003
Foil varco × 2	... 2522 001 07076
Drum for varco	... 2522 001 07079

ELECTRICAL PARTS

Part No.	Code No.
R4 (1000 ohms)	... 2315 380 74404
R13 (17K + 5K)	... 2315 381 74582
R17 (56 or 68 ohms)	... 2315 202 32569
or 2315 202 32689	
R18 (82 or 100 ohms)	... 2315 202 32829
or 2315 202 32101	
R20 (390 ohms)	... 2115 611 00005
C2/C3 (385 + 385 pF)	... 2215 807 10003
C4, C9	... 2215 808 00006
C7 (4K7 pF)	... 2015 300 07472
C11, C19 (4K7 PF)	... 2215 563 02472
C13 (3K6 PF)	... 2015 300 96014
C15 (1K8 PF)	... 2015 300 96042
C16 (6.4 MF)	... 2215 001 16648
C20 (1K5 PF)	... 2215 563 02152
C21 (5 MF)	... 2215 001 18508
C22 (6K8 PF)	... 2215 563 02682
C24 (68 PF)	... 2215 563 02689
C25 (400 MF)	... 2215 001 12401
C27, C28 (320 MF)	... 2215 001 13321

For Code Number of other electrical parts refer circuit diagram

15RL311/0S

This receiver is similar to 15RL311/00B except for the following parts.

Description	Code No.
Front assy (cabinet)	... 3115 109 00551
Back shell (cabinet)	... 3115 109 00561
Battery door	... 3115 108 02421
Ring to fix handle (outside) × 2	... 3115 104 02861

Note : Read the length of drive cord as 434 mm instead of 432 mm

During production of this set the following modifications have been introduced.

- (1) IF coil 3115 208 20390 is also used in place of 3115 308 20000 in position S14/15. The value of C15 will be 3600 pF instead of 1800 pF.
- (2) One polyester condenser of value 47000 pF is added from junction of XI/C16/C15 to negative of battery.
- (3) Negative of condenser C16 (6M4) is connected to + 2 instead of negative battery.
- (4) Value of C11 is changed to 3900 pF.
- (5) One resistor of value 1K ohms added between variable tapping of R13 and C23. Value of C23 changed to 68 KpF and value of R14 to 750K ohms.
- (6) Socket Code No. 3115 109 01281 for connecting Battery Eliminator is added.
- (7) Wire Trimmer C5 is replaced by foil trimmer Code No. 2215 808 00006.
- (8) Fixing brackets for Loudspeaker are replaced by spring Code No. 311 101 00501.
- (9) Pointer drive system modified with the following new parts :

Description	Code No.
Drum for Varco	... 3115 104 03451
Spring for Drive Cord	... 3115 101 00471
Pointer	... 3115 104 02774

Length of cord is changed to 438 mm and one pulley Code No. 3115 201 60161 is deleted.

- (10) Value of R7 is changed to 30K ohms.
- (11) Matched pair AC187/AC188 may be used to replace AC127/AC128 in position TR5/TR6 with the following changes in component values.

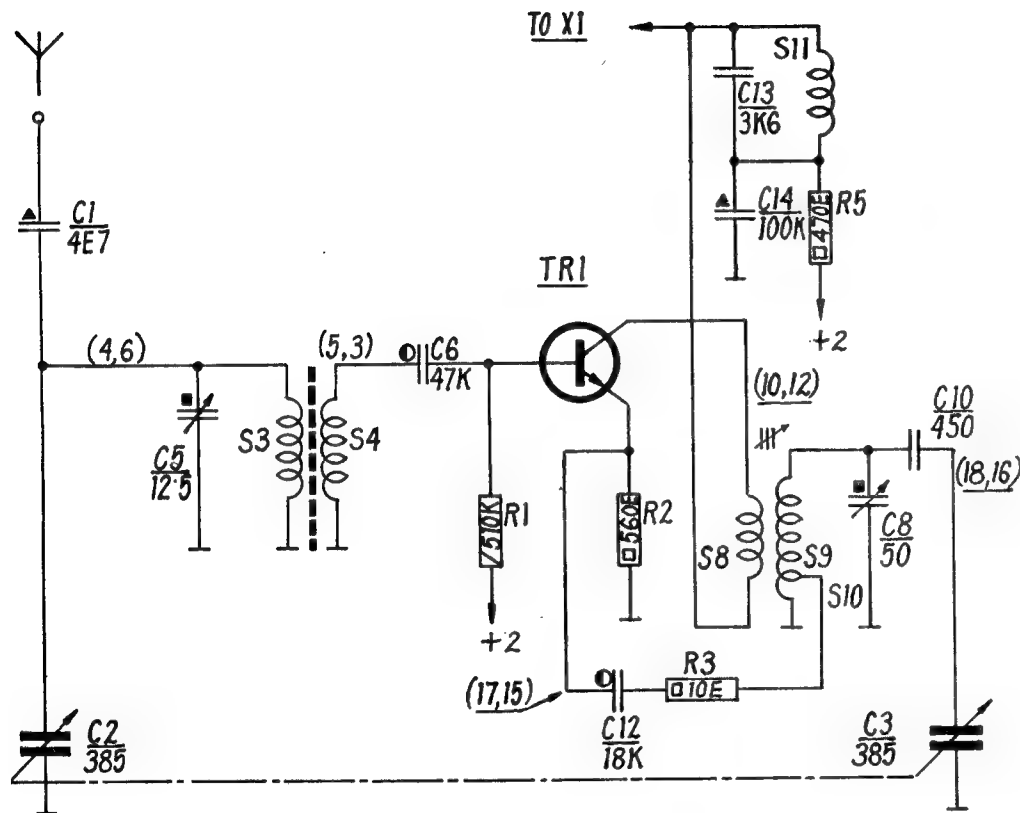
R15	...	27 ohms.
R16/19	...	1K5 ohms.
R17/18	...	100 ohms for A, B, or C pairs of AC187/AC188
	...	120 ohms for D, B, or F pairs of AC187/AC188

The following is the method for replacing the side-bracket of Handle :

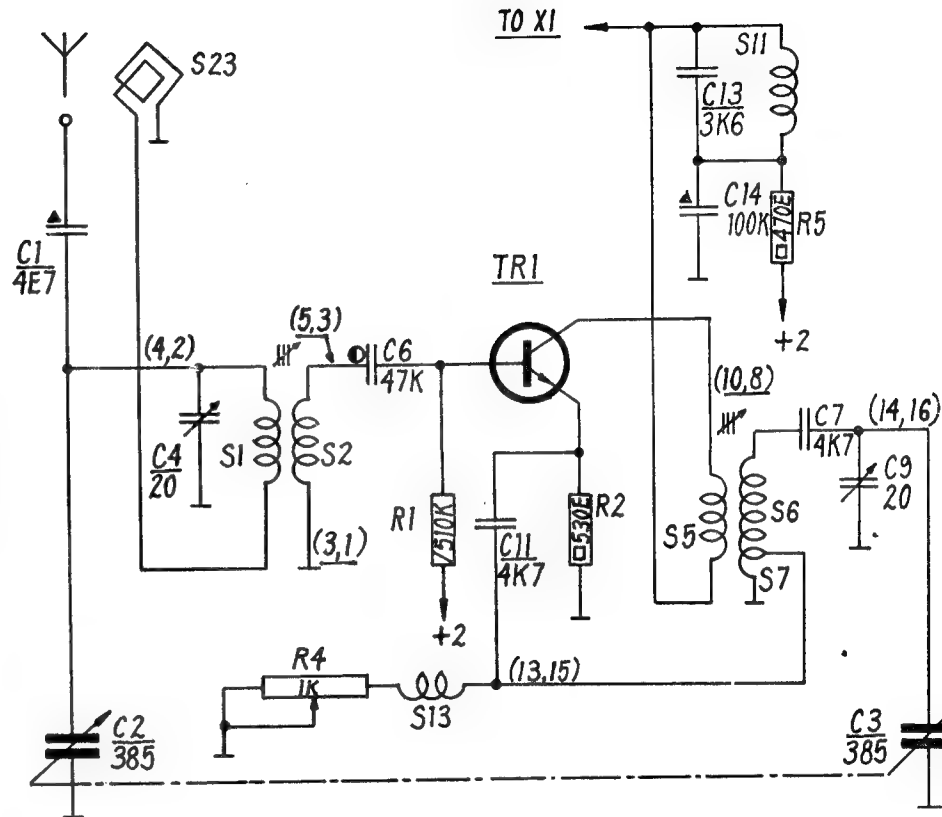
1. Remove the handle from the radio set.
2. Hold the handle vertically.
3. Hold a nose plier at the junction of handle-strip and bracket.
4. Hit the plier sharply with a mallet, then the side-bracket will come off.
5. Take a new side-bracket.
6. Coat the new bracket insert with maxifix glue and hit with a light blow to the bracket with the mallet.
7. Let the handle set for 24 hours.

RF CIRCUITS.

MW



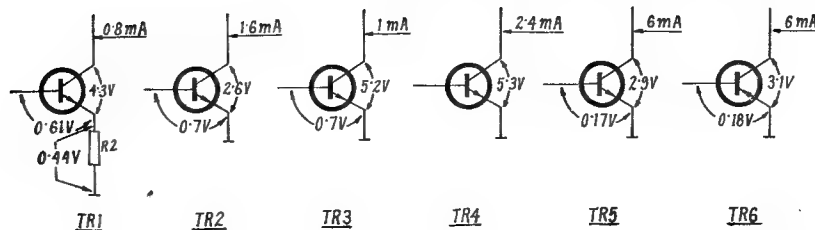
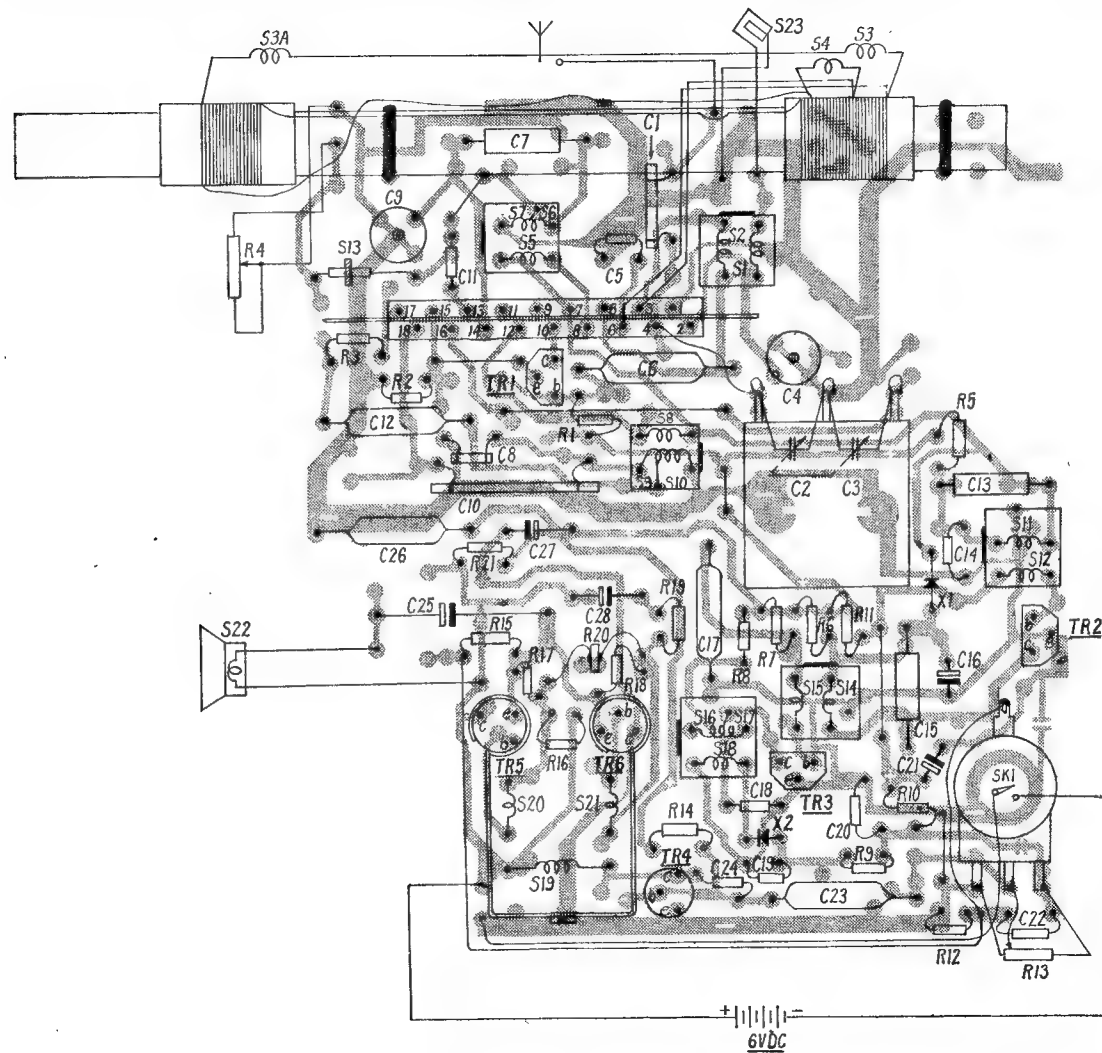
SW



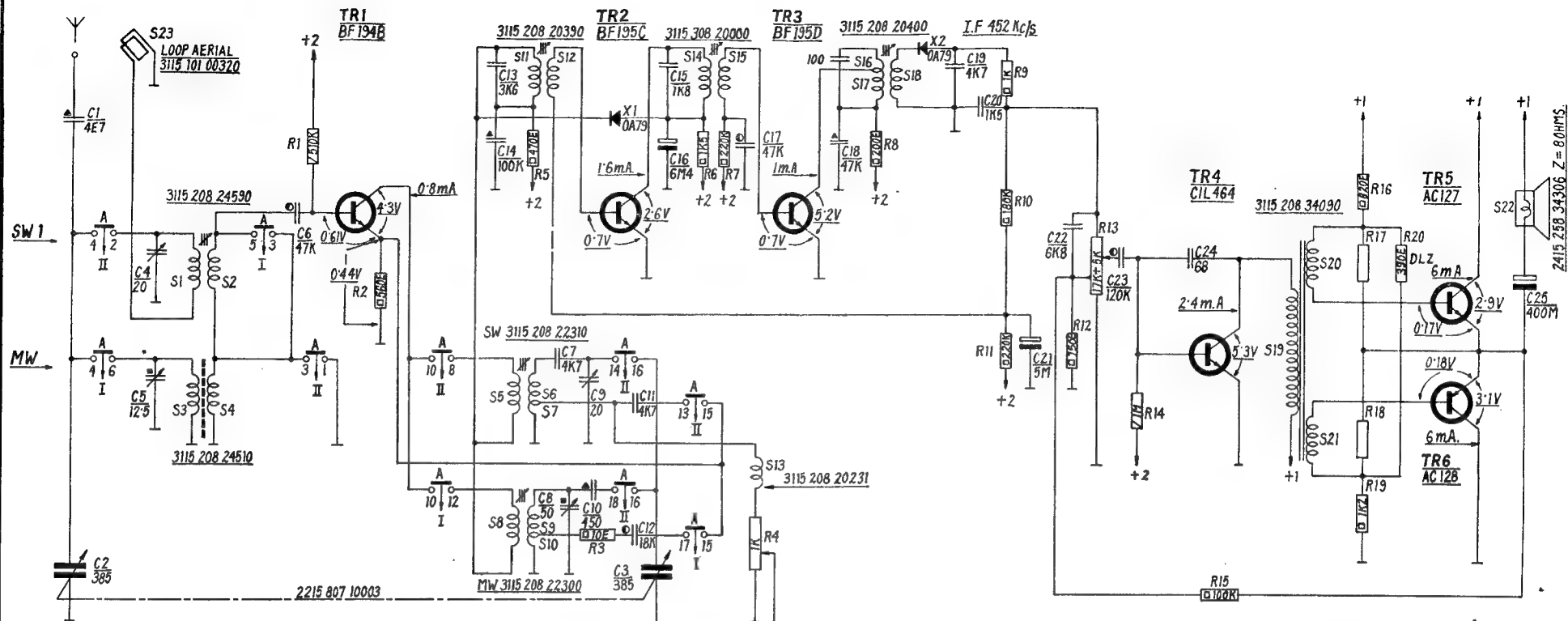
NOTE: NUMBERS INSIDE BRACKETS INDICATE SHORTING CONTACTS OF BANDSWITCH.

15RL 311/00B

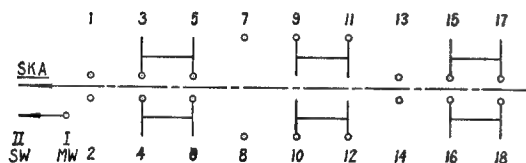
R	4.	3.	2.	21, 15, 17, 16.	20, 18, 19.	8, 7.	6.	11, 9.	10.	5.	13.
R				12, 9.	11, 8, 7, 27.	28.	1.	17, 18, 4.	23.	5.	21.
C				26, 25.	10.	5.	6.	24, 19, 2.	20.	15.	16.
C				19, 20, 21, 5, 6, 7.	8, 9, 10, 16, 17, 18, 1, 2.	23.	14, 15, 4, 3.				11, 12.
S	22, 3A	13.		TR5, TR1	TR6	TR4	X2	TR3	X1		TR2



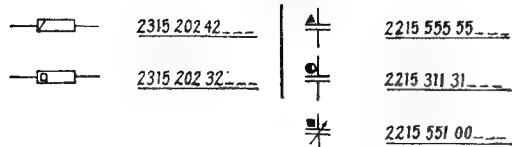
15RL 311/00B
PRINTED WIRING VIEW.



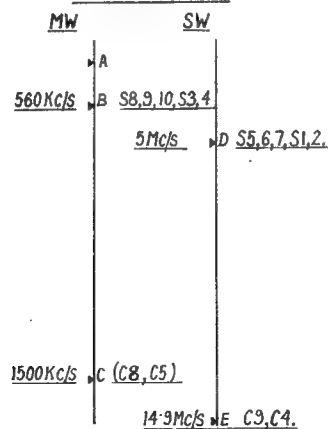
BANDSWITCH SLIDING TYPE IN MW POSITION.



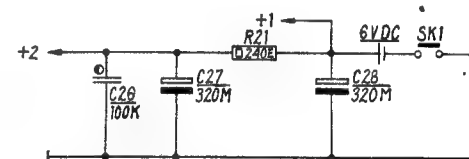
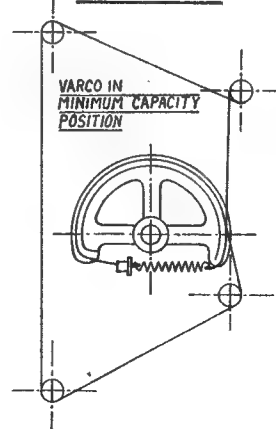
SYMBOLS.



TRIMMING DATA



POINTER DRIVE



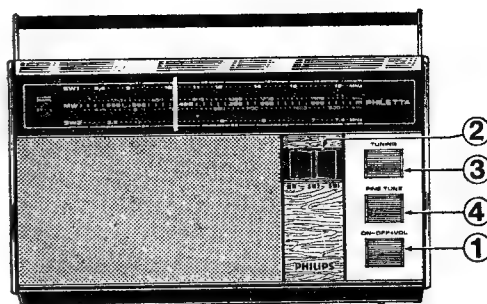
NOTE
SK1 IS COUPLED WITH VOLUME CONTROL R13.
LENGTH OF THE DRIVE CORD IS 432m.m.

15RL 311/00B
CIRCUIT DIAGRAM.



PHILIPS Service manual

RADIO 15RL312/00R



Year of release 1972

For 6 Volts Battery Supply

Waveranges

MW : 185 - 580 m (1622 - 517 KHz)
SW2 : 95.2 - 40.25 m (3.15 - 7.45 MHz)
SW1 : 35.7 - 16.48 m (8.4 - 18.1 MHz)

Controls

1. On/off switch and volume control
2. Wave range switch
3. Tuning
4. Fine tuning
6. Tone control (on rear side)

Transistor and Diodes

TR1 : BF194B
TR2 : AF117A
TR3 : BF195D
TR4 : CIL464/BC149C
TR5/TR6 : AC187/AC188 (matched pair)
X1 : OA79
X2 : SC200/SC250

Battery type

R20 or equivalent (4 × 1.5 volts cell)

Built-in-Aerial

Ferroceptor for MW

Internal loop aerial for SW1

Ferroceptor and loop aerial for SW2

Loudspeaker

2415 257 34306 (Z = 8 ohms)

Consumption

15 - 24 mA at volume control in minimum position.

Adjustment of collector current of output transistors TR5/TR6

Adjust collector current of output transistors between 6 mA and 8 mA by using following combinations (Refer circuit diagram)

Combination	Diodes X2	Transistor pair TR5/TR6 (AC187/AC188) manufacturers' marking	R24/R25
1	SC200	A, B, C	56 ohms
2	SC200	D, E	68 ohms
3	SC200	F, G	82 ohms
4	SC250	C, D	56 ohms
5	SC250	E, F, G	68 ohms

TRIMMING THE RECEIVER :—

Disconnect the loudspeaker. Connect an adaptor resistance of 8 ohms in place of speaker. Adjust volume control to maximum and tone control to treble maximum position. Keep fine tuning control at mid position.

IF Circuits

Adjust bandswitch to MW and varco to maximum capacity. Screw out cores of S11/S12 and S14/S15. Apply modulated signal of 452 KHz via 33000 pF condenser to :

1. Base of TR2 and trim S16/17/18 and S14/15 for maximum output.
2. Base of TR1 and trim S11/S12 for maximum output.

RF Circuits

Refer circuit diagram for trimming data.

Adjust the pointer to mark 'Δ' on dial, on left hand side at maximum position of Varco. Keep volume control at maximum position and trim with lowest possible signal level. Radiate signals and trim for maximum output as per trimming data.

- Note :
1. MW oscillator frequency = Tuning frequency + IF
 2. SW2 oscillator frequency = Tuning frequency + IF
 3. SW3 oscillator frequency = $\frac{1}{2}$ (Tuning frequency + IF)
 4. While trimming SW1, fine tuning potmeter to be kept at lowest frequency.

Instructions for dismantling

1. Battery door — Press at top and push downwards.
2. Back cover (cabinet) — Remove two fixing screw at the bottom of cabinet and lift the back cover.
3. Front assy — Remove three fixing screws to separate front assy from frame assembly.
4. Printed board — Remove two fixing screws to the frame assembly. To replace the slide of slide switch, lift the printed board above battery compartment after unsoldering connections from fine tuning potmeter to printed board.
5. Perspex cover with ornamental strip — Remove by pressing the perspex for dial on either sides from inside.

15RL312/00R

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Front assy	3115 209 00241	Bracket for speaker	3115 201 21580
Frame	3115 209 00231	Battery contact positive $\times 3$	3115 200 20070
Cabinet (back cover)	3115 204 03030	Battery contact negative $\times 3$	3115 101 00180
Battery door	3115 204 03020	Heat sink	3115 208 03170or 3115 205 03730
Handle	3115 208 03661	Link across drive cord spring	3115 201 00891
Dial	3115 205 00291	Bracket for fixing back cover $\times 2$	3115 201 21570
Pointer	3115 208 03690	Grille	3115 205 10650
Knob (tuning)	3115 204 03060	Ornamental plate (for knobs)	3115 205 10600
Knob (fine tuning)	3115 204 03050	Strip (philips)	3115 205 10640
Knob (volume control)	3115 204 03000	Strip (above bandswitch knob)	3115 205 10620
Slide knob (band switch)	3115 204 02980	Strip (top)	3115 205 10610
Dial cover (perspex) with ornamental profile	3115 209 00221	Grommet for varco $\times 3$	3115 204 03090
Bandswitch	3115 308 40000	Bracket for tuning knob	3115 204 03460
Slide for band switch.	3115 303 30000	Ornamental plate (top)	3115 205 10630
Tone switch	3115 208 03220	Nut for screw of lockplate	2522 401 04007
Battery eliminator socket	3115 200 20020	Bearing for tuning knob	3115 201 60960
Aerial socket	3103 993 03020	Nut for potmeters $\times 2$	4322 047 00370
Bracket assy with tone switch & socket	3115 208 03231	Eyelet for drive cord	2522 942 08132
Bracket assy with aerial socket	3115 209 00541	Screws for fixing :—	
Drive pulley $\times 3$	3122 794 04950	Cabinet (back cover) $\times 2$	2522 187 02065
Gear wheel for varco	3115 204 01860	Frame to front assy $\times 3$	2522 001 07119
Lock plate on gear wheel	3115 201 60780	Printed board $\times 2$	2522 123 89025
Drum for drive system	3115 204 02990	Speaker	2515 123 89009
Spindle for drum	3115 201 21590	Gearwheel on varco	2522 001 07077
Spring for drive cord	3122 996 46820	Screw for lockplate on varco	2522 001 07076
Spring for bandswitch slide knob	3115 201 00720	Spring for fixing bandswitch spring	2522 001 07042
Pin for slide fixing	3115 204 03010		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
C4 (15 pF modified to 6E8)	2215 555 55688	C24, C31 (5 mF)	2222 001 18508
C16 (20 pF)	2215 808 00006	C34 (400 mF)	2222 001 12401
C5 (270 pF)	5015 361 32701	C35 (2.5 mF)	2222 001 18258
C7 (540 pF)	2015 361 35401	C36, C37 (470 mF)	2222 007 13471
C8 (2K7 pF)	2015 361 32702	C40 (320 mF)	2222 001 13321
C19 (3K6 pF)	2015 360 33602	R5 (1000 ohms)	2315 380 74504
C22 (1K8 pF)	2015 361 31802	R20 (5K+17K ohms)	2315 381 74582
C21, C23, C25 (100 KpF)	2015 629 01104	R28 (33 ohms NTC)	3115 109 10131

15RL312/00R

During production the following modifications have been introduced in this model.

Part No.	Deleted	Added
R1	... 2315 202 32394* (*Also read 390K instead of 330K in RF circuit)	2315 202 32474
R2	... 2315 202 32249	2315 202 32129
R4	... 2315 202 32102	2315 202 32821
R6	... 2315 202 32821	2315 202 32681
R23	... 2315 202 32561	2315 202 32471
R26	... 2315 202 32561	2315 202 32471
R28	... 3115 109 10131	DS10
...	...	2315 202 32279 (in series with base of TR1)
C2	... 2215 551 00014	2215 808 00006 2215 555 55399 Both in parallel
C5	... 2015 361 32701	2015 361 32001
C15	... 2215 555 55392	2215 555 55332
C17	... 2215 555 55229	2215 555 55189*
X2	... SC200/SC250	DS10
Spring for Drive Cord	... 3122 996 46821	3115 201 00691

- Note :**
1. Connections of coil S2 between point 17 of slide switch and earth tag on printed board are inter-changed.
 2. Connection of coil S4 to point 11 of slide switch is now connected to point 9. The other end of S4 connected to earth is now connected to point 11 of slide switch.
 3. The position of R17 is shifted to print side of printed board.
- (* The capacitor C17 has subsequently been replaced with value 22 pF)

During production some changes have been introduced in the circuit and in the trimming data. The modified circuit diagram with the changes in the parts list are given here.

Part No.		Code No.	Part No.		Code No.
C4	20 pF	2215 808 00006	C39	56 pF	2215 607 55569
C5	270 pF	2215 569 56271	C41	47 pF	2215 563 02479
C6	39 pF	2215 607 55399	C42	10 pF	2215 808 00005
C9	4.7 pF	2015 631 02478	C43	10 pF	2215 607 56109
C10, C11	385 pF	2215 807 10008	R1	470K Ohms	2315 202 32424
C12	47KpF	2015 629 01473	R4	820 Ohms	2315 202 32821
C15	3K3 pF	2215 565 03332	R5	1K Ohms	2315 380 74504
C18	10 pF	2215 607 08109	R6	680 Ohms	2315 202 32681
C20	82 pF	2215 607 55829	R19	1M2 Ohms	2315 202 42125
C27	5K6 pF	2215 565 01562	R20	5K+17K Ohms	2315 381 74582
C28	6K8 pF	2215 565 03682	R21	2K2 Ohms	2315 202 33222
C29	100KpF	2015 629 01104	R23, R26	470 Ohms	2315 202 32471
C33	22 pF	2215 563 02229	R29	27 Ohms	2315 202 33279
C34	470 pF	2215 016 13471	X2, X3		DS10
C36, C37	470 pF	2215 016 13471	S22	Z=8 Ohms	2415 257 34206

15RL312/00R

Circuit Description

The main stages in the set include frequency changer, two IF amplifiers, detector diode, driver and output stage. Band selection is achieved by changeover contacts of a slide switch.

1. Frequency Converter

(a) DC Condition

The simplified diagrams for the different bands are given in figure for RF circuits. The DC conditions for TR1 (BF 194B) are satisfied by base resistor R1 and emitter R4 (returned to a lower potential). The collector resistor R3 takes care of bottoming effect on strong local stations.

(b) Aerial Section

The set is fitted with a ferroceptor aerial for medium wave band, whereas a frame aerial is used for SW1 and for SW2 both are used. Normally an outdoor aerial is not needed, but where used for weak stations, it can be directly connected. Minimum injection is taken by a very low value series capacitor C9.

The aerial circuit is tuned for MW by S1/S1'—C1/C10. Here S1 and C1 are adjustable for tracking purposes. For SW2 the aerial circuit is tuned by S3—C4/S23A—C2/C10. S3 and C2 are adjustable for alignment. On the SW1 band frame aerial S23A is tuned by C4/C2—C3/C5—C10. Proper tracking is achieved by C3.

The signal from the aerial section is fed to the base of TR1 through transformer coupling via S2 or S4 or S23B and C12.

(c) Oscillator Section

The oscillator is of the straightforward feedback type using the emitter-base tank (S8/9—C18—C7—C8—C11/C16 for MW, S5/6—C17—C7/C14—C8—C11/C16 for SW2, and S5/6—C17—C7—C8—C11/C16 for SW1). The feedback windings are all in series with the first IF primary. The tap on the tank circuit coil takes care of proper matching to the emitter through R2—C13 for MW, C15—C13 for SW bands. The fine tuning for short waves have been achieved by the action of a variable resistor R5 in short with S13—C20. The other resistor R7 determines the amount of frequency variation.

2. IF Amplifier

The IF signal generated by TR1 is accepted through IF transformer S11/12 by proper load matching, RF signals being strongly attenuated by C19. The DC condition for TR2 is set by base resistor R10 stabi-

lised by C24 from a voltage divider chain; and the emitter and collector are connected to higher and lower potentials respectively. The emitter voltage is stabilised by R6 and C21. The amplified signal is fed to the second IF transformer S14—S15 which couples to the next amplifier TR3. An amount of negative feedback is provided by DC coupling of the collector and base supplies of TR2 and TR3 respectively. This is provided by R8, R9 and R11 in connection with C23 and C25. TR3 amplifies the IF signal and feed to the detector via tuned transformer S16/17—S18—C39.

3. Detector

The detector diode XI is conducting by connecting its anode and cathode to suitable voltage divider networks. R14—R15/C29 from the chain for the anode and R17, R12 and R10 with C27 (and C24) supply the DC potential of the cathode via R16. AGC voltage for strong signals is fed to the base of TR2 from the diode via the same network.

4. Audio Stage

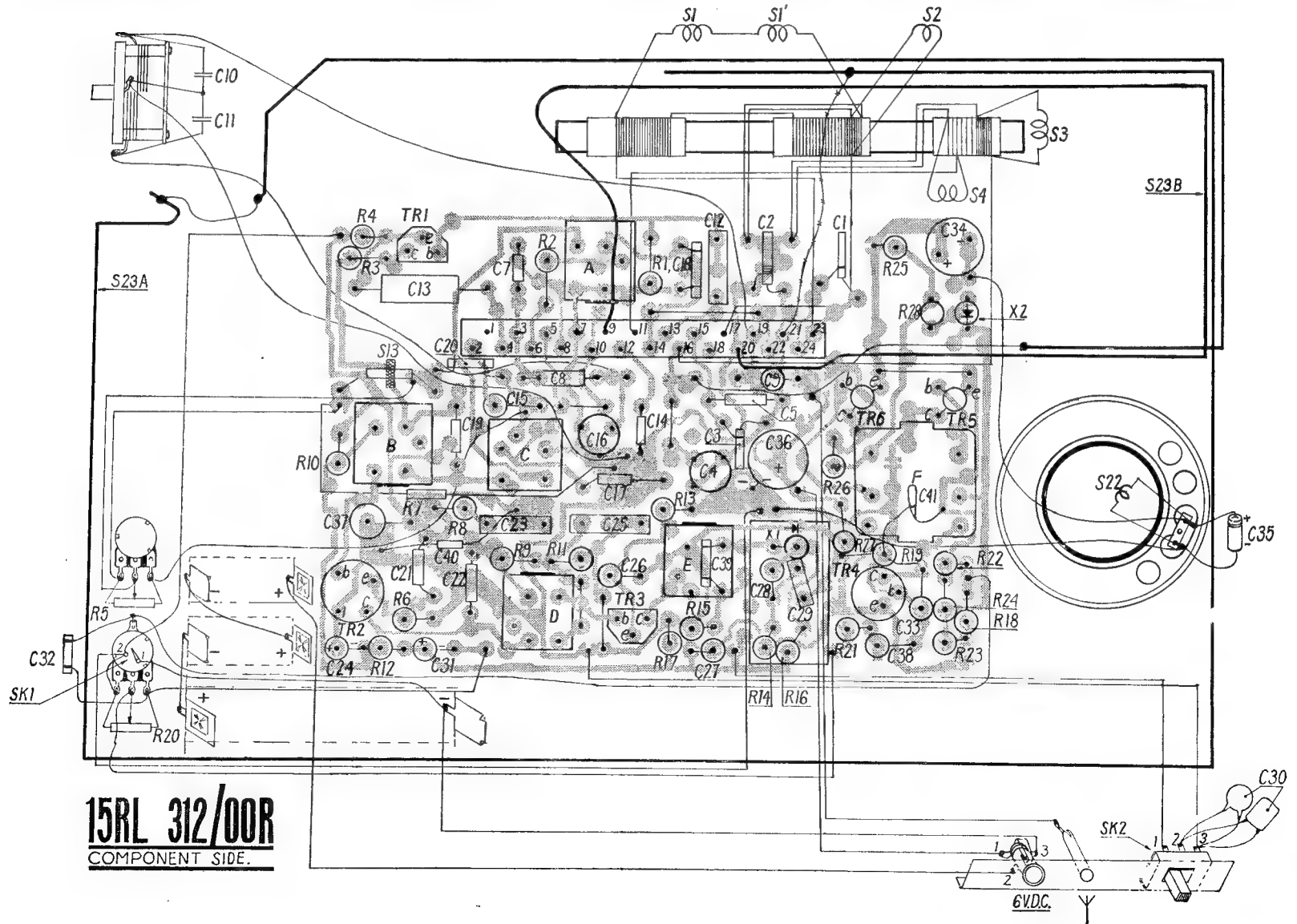
The demodulated voltage (after filtering by C28—R16—C27—R17) is fed to the volume control R20 via C31. A slight high tone boost is applied by C32 for lower volume setting. The tone switch SK2 when operated cuts off the high tones by connecting C30 across the demodulated voltage. The DC condition of TR4 is set by base resistor R19 where emitter and collector are connected to lower and higher potentials as usual. The addition of R21 in series with the coupling condenser C38 from volume control reduces the input damping of TR4 for a satisfactory volume control operation. Condenser C33 between base and collector gives an AC negative feedback for higher tones (as well as for any residual IF).

The output audio stage contains a single-ended complementary-symmetry circuit with transformer coupling from the driver TR4. The base voltages for the output transistor are set by the potential divider chain R23—R24—R25—R26 and stabilised by the diode X2 with NTC resistor R28. The collector current of the output transistors is adjusted by changing the values of R24 and R25 (see technical data). The final negative feedback from the loudspeaker point is applied to the base circuit of TR4 through R22—R18.

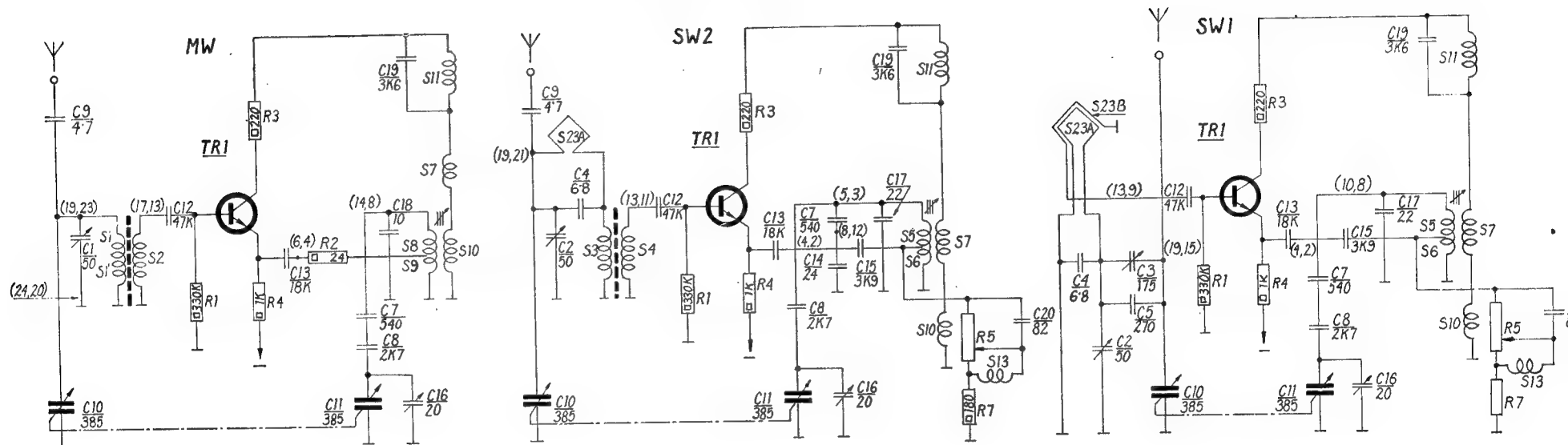
5. Power Supply Stages

The power supply section uses filter capacitor C36 and a reduced voltage is applied to RF and IF stages after addition filtering by R27/C37. The external battery eliminator supply is connected to the power section through a suitable socket which cuts off the battery circuit automatically.

R	5,	20,	10,	4, 12, 7,	8,	9, 2,	1, 13	14, 16,	26, 27, 25, 19,	23, 22, 18,
R				3, 6,		11,	17, 15,		21, 28,	24,
C	32,	10,	37,	13, 20, 22,	7, 15	8	16, 17, 26, 14,	12, 3, 39, 2, 36, 29,	1,	38, 41, 34,
C		11,	24,	21, 31, 40, 19,	23,		25,	18, 4, 27, 9, 28, 5,	33,	
	S23A		TR2, 13, B, TR1,		C,	D, A	TR3, 1, E,	1' X1,	TR4, TR6, F, 2,	TR5, 4, X2, 3,
									S22, S23B	



RF CIRCUITS.

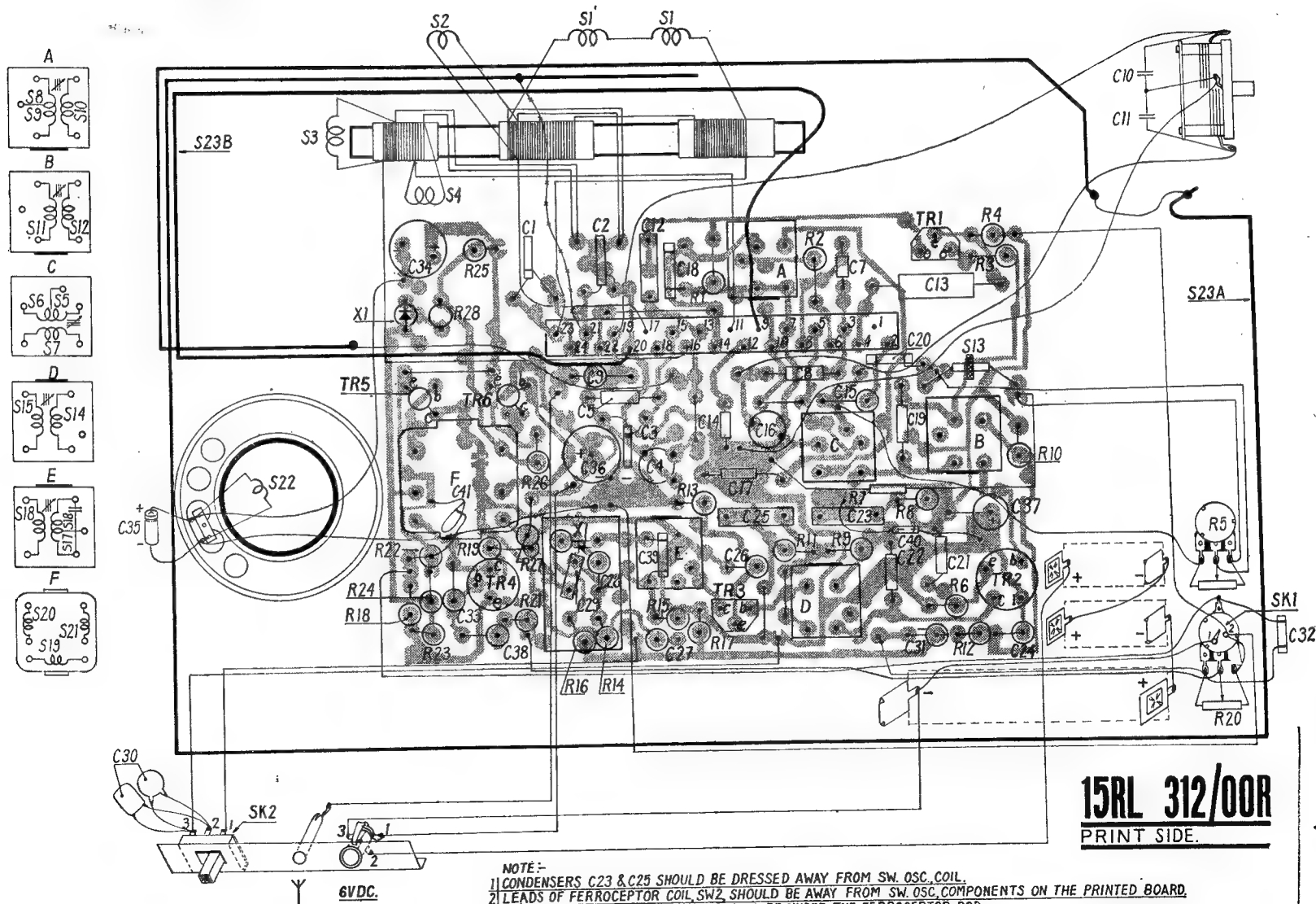


NOTE:- NUMBERS IN BRACKETS INDICATE SHORTING CONTACTS OF BANDSWITCH.

In SW1 the capacitor C9 is not shown in the aerial circuit.
This is to be included while reading the circuit.

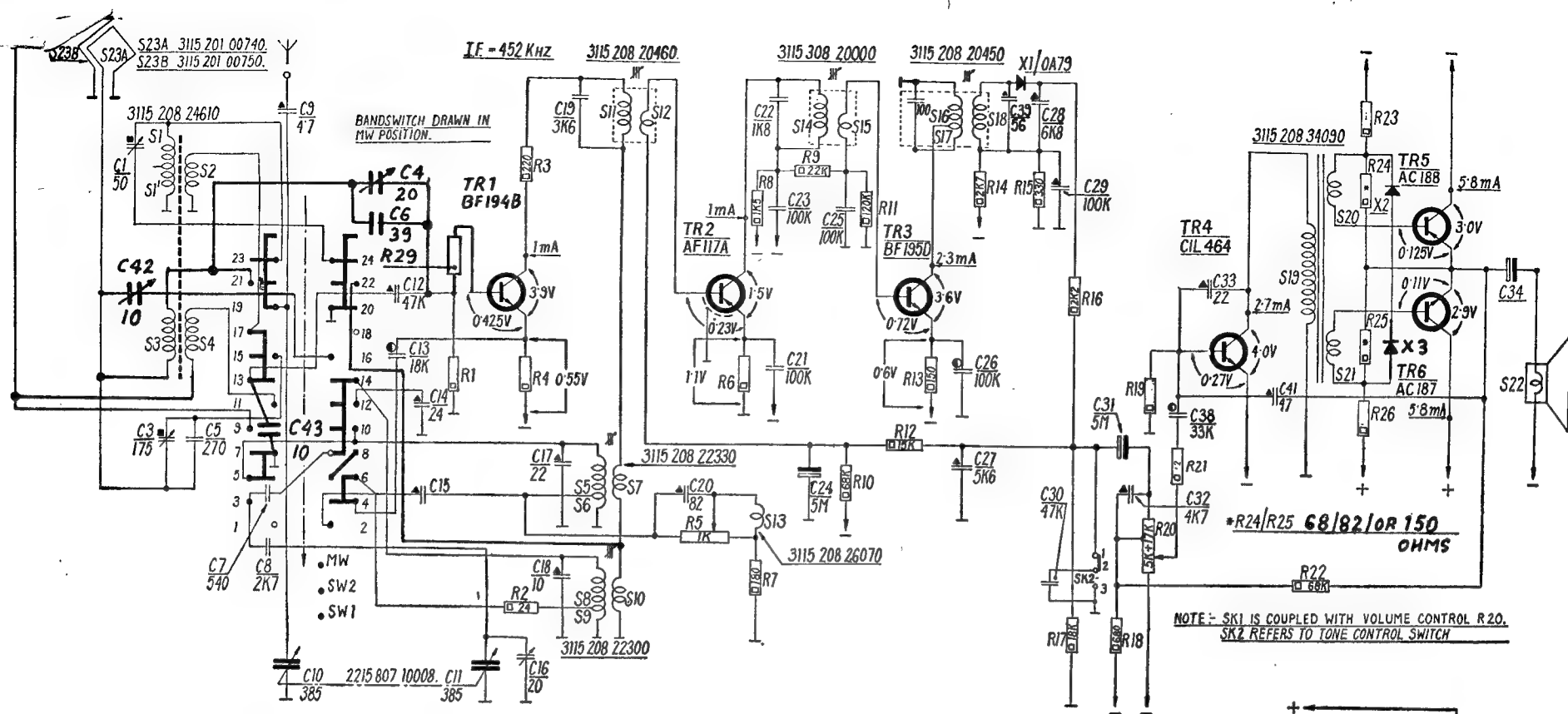
15RL 312 / 00R

R		24, 22, 23, 28, 25, 26, 27, 14, 16, 15, 1, 11, 2, 9, 7, 8, 12, 4, 10, 5,	
R		18, 19, 21, 13, 17, 6, 3, 20,	
C	35,	34, 41, 33, 38, 29, 23, 28, 3, 12, 27, 14, 17, 16, 8, 15, 7, 40, 20, 19, 13, 37, 10, 32	
C	30,	5, 36, 4, 39, 18, 26, 25, 23, 31, 22, 21, 24, 11,	
	S23B, S22, 4, TR6, X2, F, 2, 3, TR5, TR4, X1, I, I, E, TR3, A, D, C, TRI, B, TR2, S23A		



15RL 312/00R
PRINT SIDE.

M. Papadimitriou
SEA 1 AIR



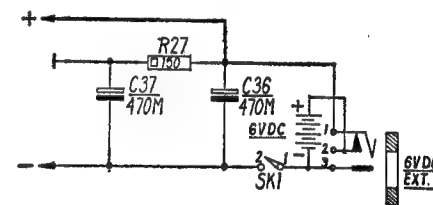
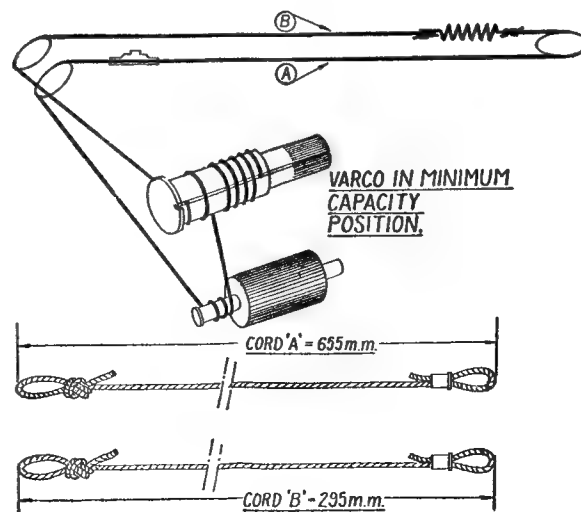
TRIMMING DATA.

SR NO.	WAVE	POSITION OF RANGE.	VARCO.	TRIMMING FREQUENCY.	ADJUST FOR MAX. OUTPUT.
1	MW.	MAXIMUM.	▲	517 KHZ	S8,S9,S10
2	MW.	MINIMUM.	▲	1622	C16.
3	SW2	MAXIMUM.	▲	3.05MHz	S5,S6,S7
4	REPEAT 1, 2, AND 3.				
5	MW.	TUNED.		550 KHZ.	S1,S1',S2.
6	MW.	TUNED.		1500KHZ.	C1.
7	REPEAT 5 AND 6.				
8	SW2.	TUNED.		3.4 MHz	S3,S4.
9	SW2.	TUNED.		6.2 MHz	C4
10	REPEAT 8 AND 9.				
11	SW1.	TUNED.		9.6MHz.	C3.
12	SW1	TUNED		15.0MHz	C42
13	REPEAT 11 AND 12				

SYMBOLS.

	2315 202 32	$\frac{1}{8}W$		2215 555 55
	2315 202 42	$\frac{1}{4}W$		2215 311 31
	2215 551 00			

POINTER DRIVE.



15RL312/00R



PHILIPS Service manual

RADIO 15RB327/00B



Year of release 1972

For AC Mains Supply

Waveranges

MW : 185 - 580 m (1622 - 517 KHz)

SW2 : 95.24 40.54m (3.15 - 7.4 MHz)

SW1 : 31.9 13.63m (9.4 - 22 MHz)

Control Knobs

1. On/Off switch and volume control
2. Wave range selector or switch
3. Tuning
4. Fine tuning
5. Tone control

Transistors, diodes and dial lamps

TR1 : BF194B

TR2 : BF195C

TR3 : BC148C

TR4 : BC148B

TR5 & TR6 : $2 \times$ AC188 (matched pair)

X1 : OA79

X2 : 3115 107 30080

L1 : 3115 107 30110 (12V - 150 mA)

Loudspeaker

2415 257 30205 (Z = 4 ohms)

Consumption

Approximately 40 mA at 230 volts AC supply at minimum volume.

Built-in-Aerial

Ferroceptor for MW & SW2. Loop aerial for SW1. Switch for internal/external aerial connection is provided.

Current adjustment

Keep the volume control in minimum position. Include a DC milliammeter in collector lead of TR6. Adjust the collector current to 11 ± 4 mA by selecting for R31/R33 27 ohms resistor for A, B, C or D output pair and 30 ohms resistor for E, F or G output pair transistors. The set should be switched on with 230 volts AC 50 Hz.

Adjust the collector current of TR4 to 13 ± 3 mA by selecting for R 28, 82 K ohms or 91 K ohms resistor.

TRIMMING THE RECEIVER :—

Refer circuit diagram for trimming data.

General

Replace the loudspeaker by 4 ohms resistor, connect an output meter across the resistor. Adjust pointer to Δ at left hand side of the dial scale in maximum capacity position of gang condenser. Trim IF and RF circuit with lowest possible input signal as follows :

IF Circuits

Adjust gang condenser to minimum capacity and volume control to maximum position. Apply modulated 452 KHz signal via 33000 pF condenser on—

1. Base of TR2 and trim S7 for maximum output
2. Base of TR1 and trim S6/S5 for maximum output.

RF Circuits

Apply signal via dummy antenna to aerial socket and trim for maximum output at frequencies according to trimming data.

Note : Oscillator frequency for

MW = Tuning frequency + I.F.

SW2 = Tuning frequency + I.F.

SW1 = $\frac{1}{2}$ (tuning frequency + I.F.)

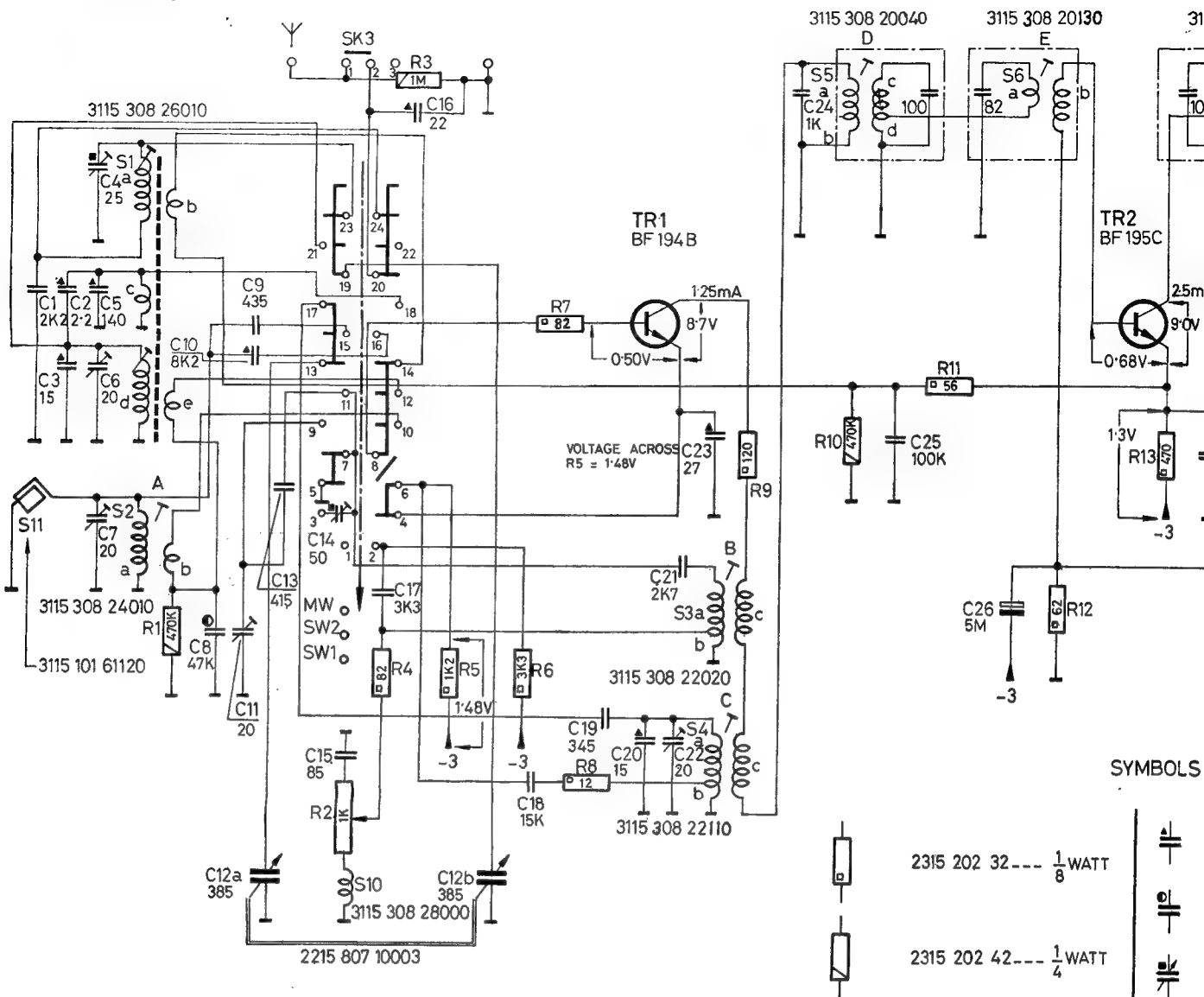
MECHANICAL PARTS

Description	Code No.	Description	Code No.
Cabinet assy	3115 109 00760	Tuning Spindle	3115 101 61110
Front assy	3115 109 00810	Drive roller assy X2	3122 107 50990
Back plate	3115 103 00191	Pointer drive roller	3122 794 39640
Rubber feet	3115 104 04411	Nut for 16mm potmeter X2	3115 100 40450
Dial	3115 105 00791	Nut for 23mm potmeter	3115 100 40020
Glass plate	3115 108 51021	Ball for bandswitch	2622 890 00817
Front Grille	3115 104 03311	Bandswitch lever	3115 104 03340
Pointer	3115 109 00781	Pin for slide	3115 204 03010
Ornamental plate (top)	3115 105 10790	Bracket for fixing backcover X3	3115 104 03290
Ornamental plate (bottom)	3115 105 10770	Spindle for bandswitch lever	3115 100 40470
Ornamental plate (knobs)	3115 105 10800	Spring for fixing : Drive cord	3122 996 46820
Knob (tuning)	3115 109 00741	Bandswitch	3115 101 00460
Knob (On/Off & Volume)	3115 109 00801	Ring for fixing : Finetune/Tone/Tuning knob	3122 100 40770
Knob (Tone/P.U./Fine tuning)	3115 109 00731	Volume Control knob	3122 993 19130
Knob-Band	3115 109 00791	Bandswitch knob	2512 700 08075
Wave range slide switch	3115 308 40010	Screws for fixing : Cabinet X3	2515 123 89002
Slide for above	3115 303 30011	Backplate X3	2522 001 07099
Mains cord assy	3115 108 50150	Varco X2	2522 001 07076
Lamp holder assy	3115 100 10050	Varco bracket X3	2522 001 07414
Aerial switch	3115 108 40551	Gearwheel	2522 001 07078
Plate assy with aerial/earth socket	3115 109 00771	Printed board X2	2522 001 07097
PU/TR socket	2422 026 00884	Rec/PU socket X2	2522 123 89001
Grommet for ferroceptor X2	2422 015 09043	Dial X4	2415 123 89002
Rubber cap for volume control	3115 104 03350		
Bracket for varco	3115 109 00751		
Grommet for above X3	3122 114 00030		
Drum for varco	3115 104 03320		
Gear wheel	3115 204 01861		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
C1 (2200 pF)	2015 300 15222	C38 (2.5 mF)	2215 001 18258
C6, C11, C22 (20 pF)	2215 808 00006	C39 (68 pF)	2215 555 55689
C9 (435 pF)	2015 361 34351	C42 (5 mF)	2215 001 18508
C13 (415 pF)	2315 301 96047	C43/C44/C50 (640 mF)	2215 023 44641
C51 (82pF)	2215 555 55829	C47/C48 (1000/1500 mF)	3115 107 30070
C17 (3300 pF)	2215 563 02332	C49 (220 mF)	2215 016 15221
C18 (15000 pF)	2015 629 03153	R2 (1000 ohms)	2315 381 84404
C19 (345 pF)	2015 300 96024	R19 (100K ohms)	2315 380 84431
C21 (2700 pF)	2015 300 10272	R23 (50K+170K ohms)	2315 353 13083
C24 (1000 pF)	2015 300 15102	Thermal Fuse (F1)	3115 208 02831
	or 2015 300 10102	Lamp L1 (12V - 150 mA)	3115 107 30110
C25, C27, C28 (100K pF)	2015 629 01104		
C26 (4 mF)	2215 001 17408		
C27 (220 pF)	2215 563 02221		

R	1.	2.	4.	3.	5.	6.	7.	8.	9.	10.	11.	12.	13.		
C	1. 2.3. 4.5.6.7	10.8.	9.11.12a.	13.	14.15.	17.	16.	12b.	18.	19.	20.	21.22.23.	24.	25.	26.
S	1	S1a.bcd S2ab.	10						S3abc S4abc	S5a.bcd.			S6a.b.		



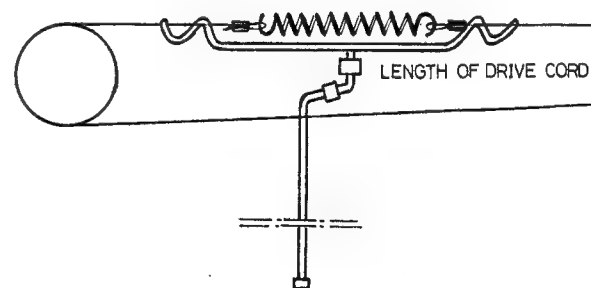
TRIMMING DATA.

SR NO.	WAVE RANGE.	TRIMMING FREQUENCY.	SET POINTER AT.	TRIM FOR MAXIMUM OUTPUT. OSCILLATOR.	ANTENNA.
1	MW.	560KHz.	A.	C.	S1a.
2		1500KHz.	B.	C22.	C4.
REPEAT 1 & 2.					
3	SW1.	9.55MHz.	C.	B.	A.
4		21.6MHz.	D.	C11.	C7.
REPEAT 3 & 4.					
5	SW2.	3.48MHz.	E.		S1d.
6		7.0MHz.	F.	C14.	C6.
REPEAT 5 & 6.					

MW

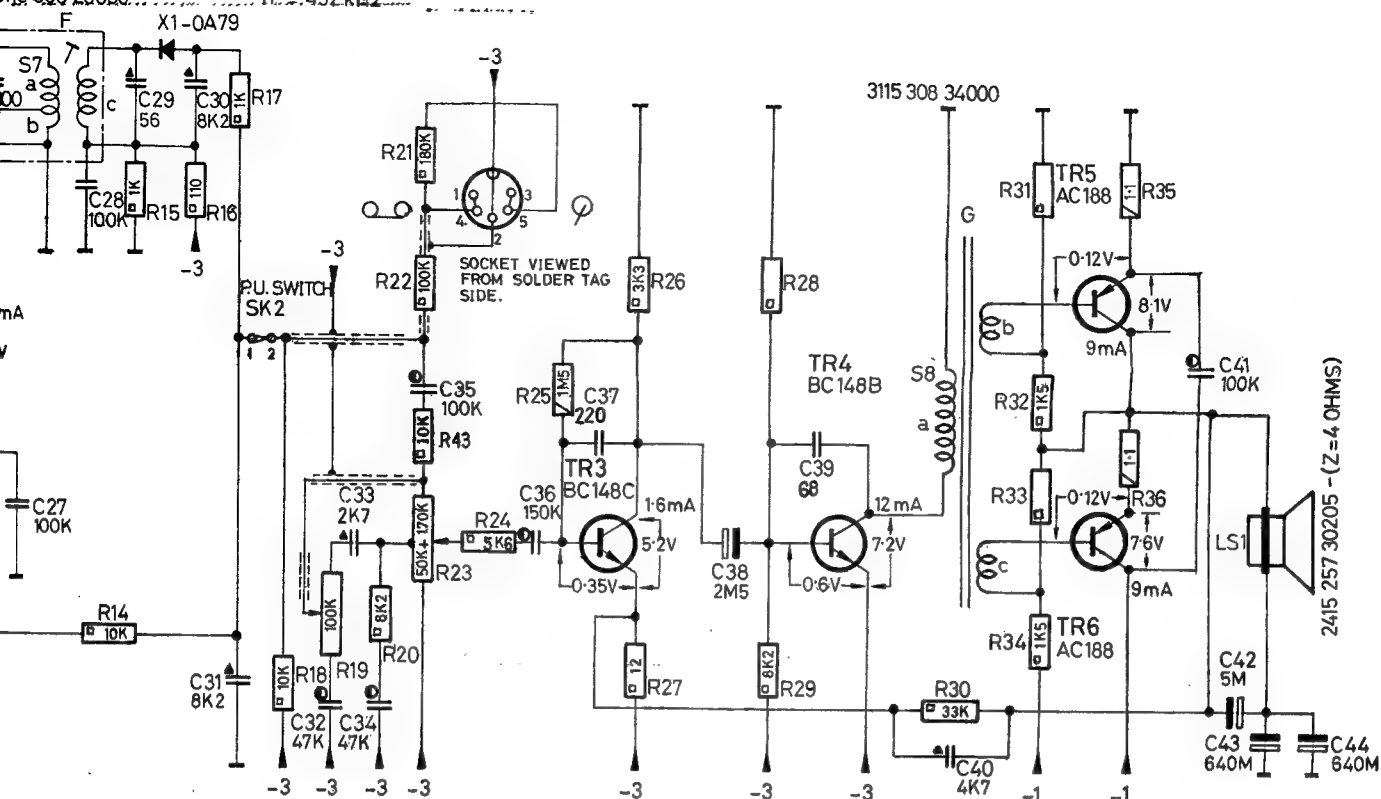


POINTER DRIVE



- NOTE 1) SK1 IS COUPLED WITH VOLUME CONTROL R23.
 2) SK2 IS COUPLED WITH FINE TUNING CONTROL
 3) CIRCUIT IS DRAWN IN MW POSITION.
 4) VALUE OF R28 MUST BE SELECTED BY A RESISTOR
 5) VALUE OF R31-R33 MUST BE SELECTED BY A RESISTOR

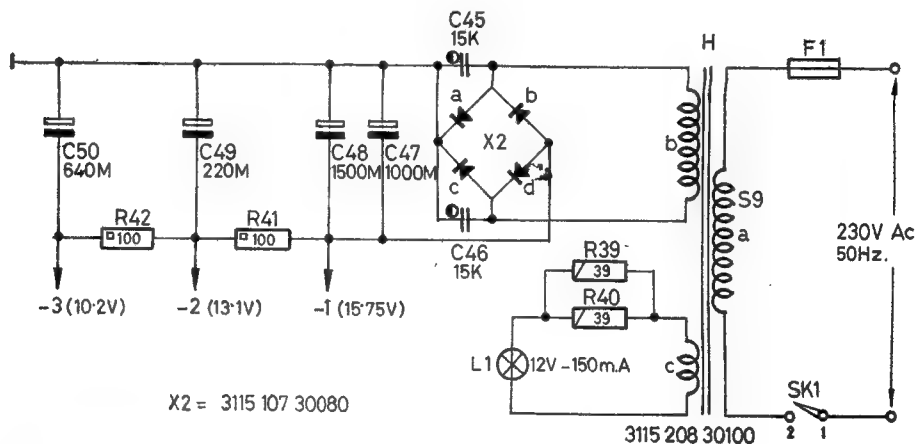
015 308 20030... IF = 452 kHz...



2215 555 55 --- CERAMIC

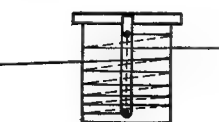
2215 311 31 --- POLYESTER

2215 551 00 --- WIRE WOUND



VE

D IS 900mm.



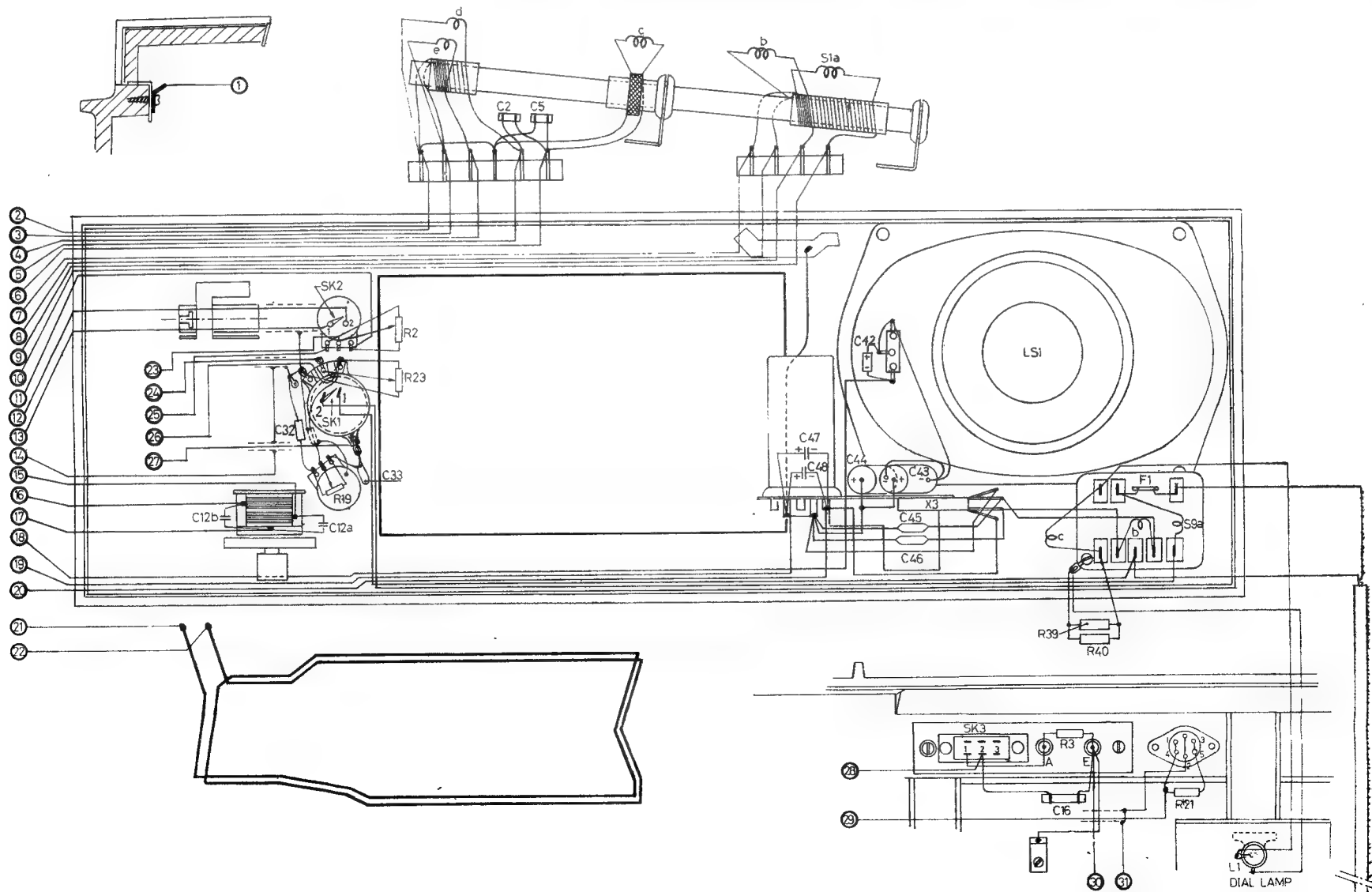
VARCO IN MAXIMUM
CAPACITY POSITION

15RB 327/00B

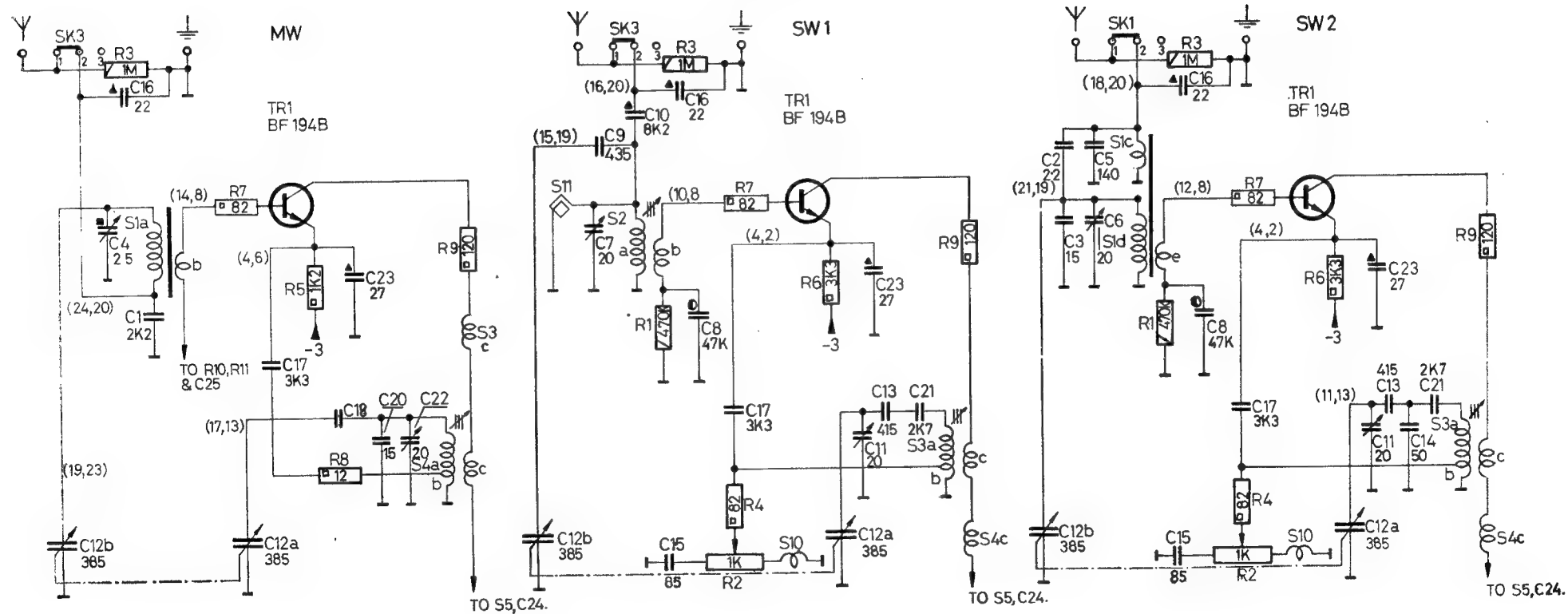
R 2.

RESISTOR OF 100K-91K OR 82K-OHMS.
RESISTOR OF 27 OR 30 OHMS.

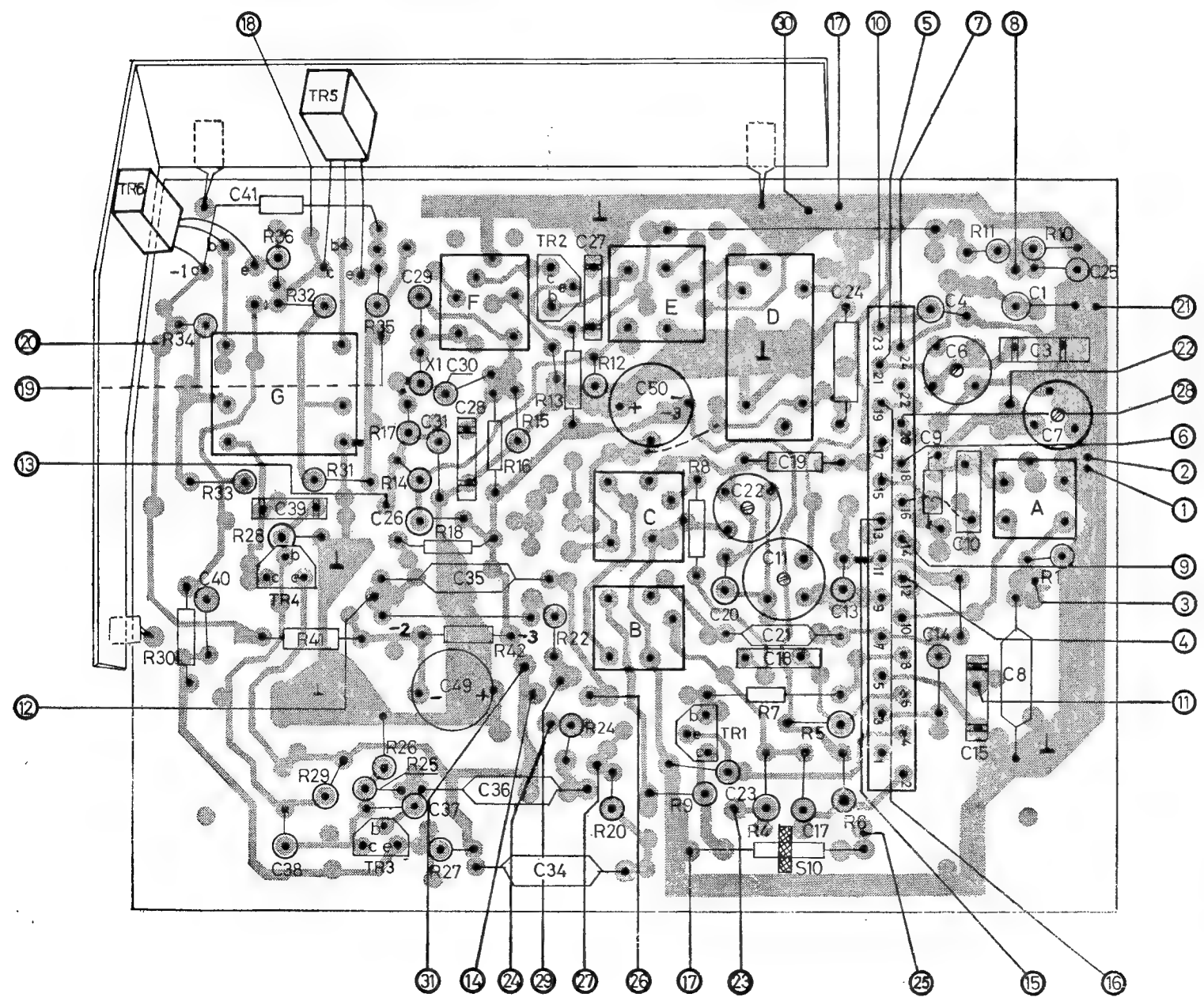
R			19.	2, 23.						39, 3.	40.	21.	R
C	12b.	32.	12a.	33.	11.	e.	d.	2.	5.	47, 48.	44, 42.	45, 46, 43	C
S								c.	b.	S1a	X2.	16.	S
										LS1, c.	b.	S9a.	L1.



RF CIRCUITS.

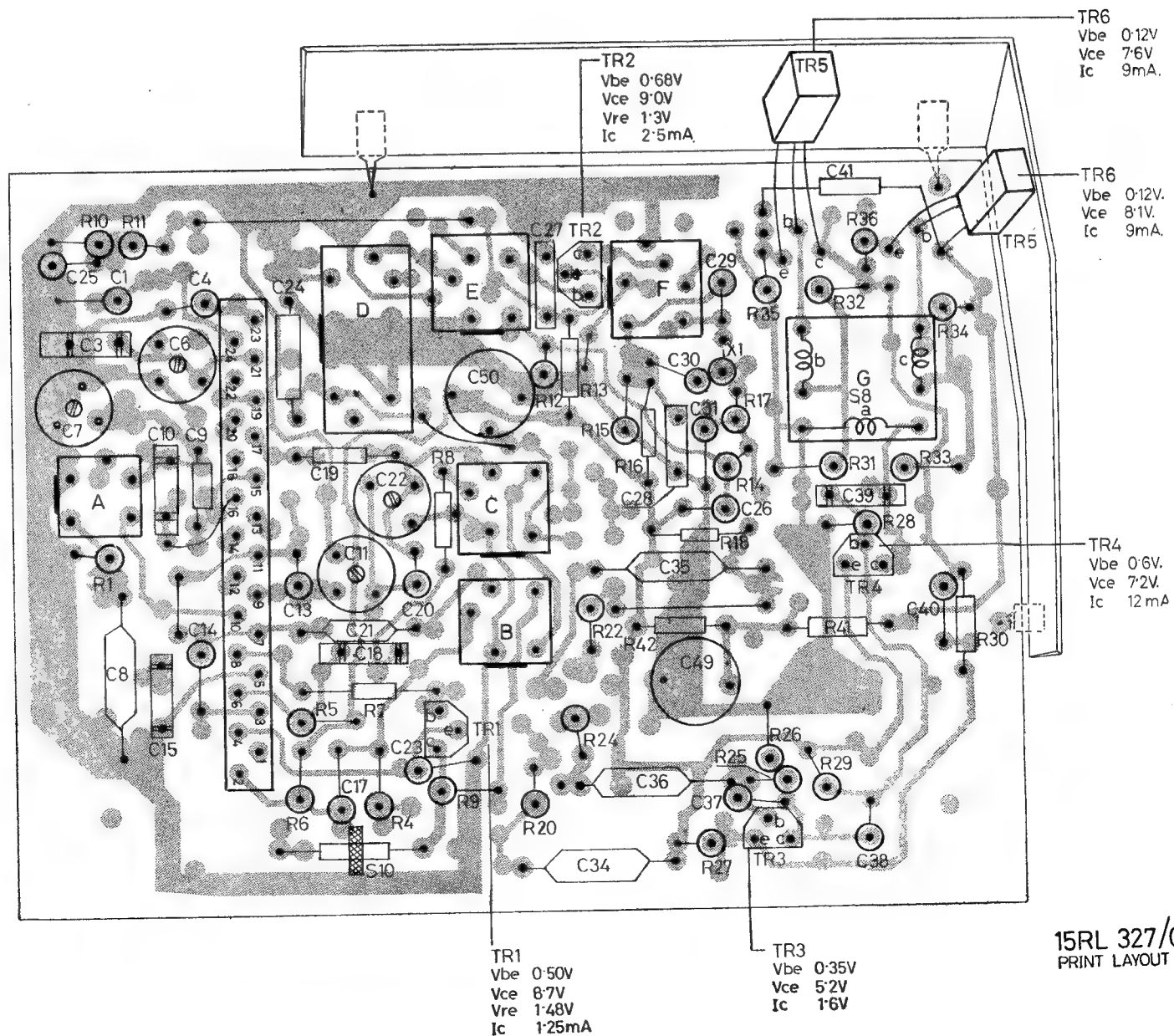
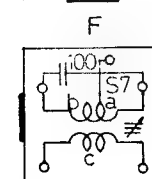
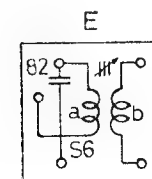
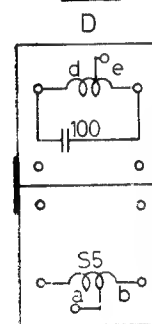
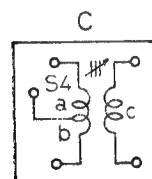
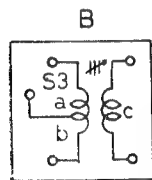
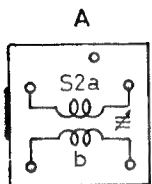


R	30,34.	33.	28.	36.	32.	31.	35,14.	25,18.	16.	15,13.	24.	12.	9.	4.	7.	5.	6.		11.	10.	R		
R					41,29.	17.	26.	27.	42.	22.	20.		8.							1.	R		
C		40.	41.	39.		26.	31,49.	30,36.	34.	27.	50.		23.	11.	17.	24.		9.	4,15.	8.	1.	25.	C
C				38.			29,37.	35,28.					20,22.	21,18.	19.	13.		14.	6,10.	3.	7.		C
	TR5.				G. TR4. TR6.		TR3. X1. F.		TR2.		B.C.E.	TR1.	D.										



15RL 327/00B
COMPONENT LAYOUT

R	10. 11.	6. 5.	7. 4.	8. 9.	20. 13.15.21. 16.	17. 35.	41.32.36. 43. 33.34. 30.	R
R	1.				12.14.24. 22. 42.	27.18.25.14.26.	29. 31. 28.	R
C	9. 25. 1.	10. 6.4.	24. 19.11.21. 22. 20.	50.	27. 34.	28. 35. 31. 29. 26.	41. 40.	C
C	3.8.	15. 9.14.	13.	17. 18. 23.		36. 30.49.37.	39.38.	C
	A.		D.	E. C. B.	F.	X1.	G.	

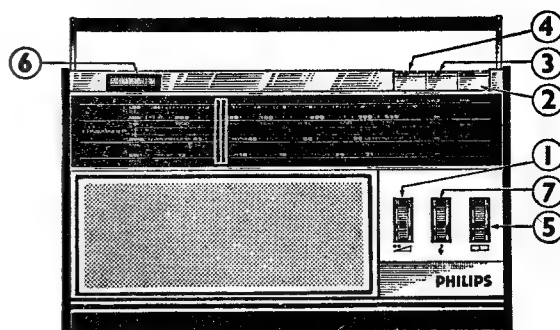


15RL 327/00B
PRINT LAYOUT



PHILIPS Service manual

RADIO 15RL412/00R



Year of release 1972

For 6 Volts Battery Supply

Waveranges

MW : 185 - 580 m (1622 - 517 KHz)

SW2 : 93.7 - 41.1 m (3.2 - 7.3 MHz)

SW1 : 31.6 - 13.8 m (9.5 - 21.75 MHz)

Controls

1. On/off switch and volume control (R20)
2. Press Key—MW
3. Press Key—SW2
4. Press Key—SW1
5. Tuning
6. Fine Tuning (R1)
7. Tone control (R19)

Transistors & Diodes

TR1 : BF 194 B
TR2 : AF 117
TR3 : BF 195 C
TR4 : CIL 463/BC 148 A
TR5 : BC 150 B
TR6/TR7 : AC 187/AC 188 (matched pair).
X1 : OA 79
X1 : CD 2

Battery Type

R 20 or equivalent (4×1.5 volts cell).
Socket for battery eliminator provided.

Built-in-Aerial

Ferroceptor for MW
Internal loop aerial for SW

Loudspeaker

2415 255 80106 (Z = 5 ohms)

Consumption

17 - 25 mA at volume control in minimum position

Adjusting collector current of output transistors TR6/TR7

Turn volume control to minimum position. Connect a volt meter between the common emitter points of TR6/TR7 and positive. Include DC milliammeter in the collector lead of TR7 and positive. Using 6 volts supply to operate the set, adjust the voltmeter reading to 3 volts by means of R24 and milliammeter reading to 5.0 mA (+1.0 mA) by means of R25.

Trimming the receiver :—

Replace loudspeaker with 5 ohms resistor. Set pointer on zero mark of log scale in maximum capacity position of Varco. Adjust volume control to maximum position.

IF Circuits

Screw out cores of I.F. coils S14 to S22.

Apply modulated signal of 452 KHz via 33,000 pF condenser to :

- (1) Base of TR3—trim S20/21 for maximum output.
- (2) Base of TR2—trim S18 for maximum output.
- (3) Base of TR1—trim S14 to S17 for maximum output.

RF Circuits

Refer circuit diagram for trimming data. Trim with modulated signal applied to aerial socket for maximum output at frequencies shown in trimming data.

Note : Oscillator frequency=Trimming frequency+I.F.

Instruction for dismantling

- (1) Back Plate : Remove two fixing screws at the top of back plate.
- (2) Front Assy : Remove one fixing screw in battery compartment. Slide the front assembly slightly. Remove the dial cover by pulling out. Remove the pointer by pulling out.
- (3) To remove fixing nuts of potmeters use special spanner Code No. 7115 340 12401.
- (4) To clean/replace the slide of band switch, remove four screws fixing printed board to the centre section of the cabinet. Tilt the printed board so as to have access to the slide of the slide switch and pull out the slide.

Note : Band switch keys to be pressed in depressed portion only.

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Front assy	... 3115 208 03260	Lockplate on gear wheel	... 3115 201 60900
Centre section (cabinet)	... 3115 209 00421	Connect piece for slide	... 3115 204 03150
Back plate	... 3115 204 03250	Bush for tuning spindle	... 3115 204 03120
Battery door	... 3115 204 03191	Nut for connect piece for slide	... 2522 401 02005
Handle	... 3115 208 03281	Nut for fixing potmeters × 3	... 4322 047 00370
Dial	... 3115 205 00301	Grommet for fixing ferroceptor rod × 2	... 2422 015 09044
Dial cover	... 3115 204 03160	Grommet for varco bracket × 3	... 3115 204 03090
Jewel (fine tuning)	... 3115 204 03131	Battery contact tag (+ve) × 2	... 3115 200 20070
Ornamental strip (top left)	... 3115 205 10670	Battery contact spring (-ve) × 2	... 3115 101 00180
Ornamental strip (top right)	... 3115 205 10660	Spring for fine tuning knob	... 2503 996 01001
Ornamental plate (knobs)	... 3115 205 10700	Battery Spring (-ve) × 2	... 3115 201 01040
Pointer	... 3115 208 03741	Battery eliminator socket	... 3115 200 20130
Trolley for pointer	... 3115 204 04011	Aerial socket	... 3103 993 03020
Knob (tuning)	... 3115 208 03270	Heat sink	... 3115 201 60660
Knob (volume control)	... 3115 204 03240	Strap for removal of batteries × 2	... 3115 204 03140
Knob (tone control)	... 3115 204 03200	Screws for fixing :	
Knob (fine tuning)	... 3115 209 00401	Backplate × 2	... 2522 001 07125
Drum (pointer drive)	... 3115 204 03210	Printed board × 4	... 2515 123 89025
Gear wheel (varco)	... 3115 204 01860	Battery eliminator socket × 2	... 3115 200 40420
Push button assy	... 3115 208 03310	Slide for bandswitch	... 2522 001 07045
Cover plate for P. B. assy	... 3115 204 03291	Lockplate & varco × 3	... 2522 001 07076
Button (SW1/MW) × 2	... 3115 209 00381	Gearwheel × 1	... 2522 001 07077
Button (SW2) × 1	... 3115 209 00391	Bandswitch × 2	... 2522 001 07122
Left spring for above × 3	... 3115 201 00770	Retaining ring for fixing :	
Lever for bandswitch	... 3115 204 03320	Varco bracket × 3	... 2522 634 04005
Spring (drive cord)	... 3115 201 00790	Pulley on switch assy × 1	... 2522 634 04002
Slide switch	... 3115 308 40000	Drive drum × 1	... 2522 634 04004
Slide for slide switch	... 3115 303 30000	Spanner to remove potmeter fixing nuts	... 7115 340 12401
Drive pulley × 1	... 3115 201 60850		
Drive Pulley × 2	... 3115 201 60810		
Bracket for assy varco & drum	... 3115 209 00441		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R1 (1K ohms)	... 2315 380 74404 or 2315 380 04404	C2, C21, C22 (1K pF)	... 2015 361 31002
R19 (22K ohms)	... 2315 380 75408 or 2315 380 04408	C3, (27 pF)	... 2215 555 08279
R20 (17K + 5K ohms)	... 2315 381 74482 or 2315 381 04482	C5, C6, C8, C14, C19	... 2215 808 00006
R24 (220K ohms)	... 2315 411 02212	C13 (2K 2 pF)	... 2015 361 32202
R25 (220 ohms)	... 2315 411 02202	C23, C33 (5 mF)	... 2222 001 18508
R28 (82 ohms)	... 2115 611 00008	C25 (3K6 pF)	... 2015 361 33602
		C42 (800 mF)	... 2 × 2222 001 12401
		C44 (1000 mF)	... 2015 026 43102
		C45 (320 mF)	... 2222 001 13321

During production the following changes have been introduced :

Part No.	Deleted	Added	Part No.	Deleted	Added
R12	2315 202 32184	2315 202 32224	C26	2215 555 55104	...
R13	2315 202 32151	2315 202 32221	S20/S21/S22	3115 208 20451	3115 107 30041

Note : 1. Code No. of S24 is 3115 308 28011

2. Connection of C16 to junction R5/C47 & TR1 base to be deleted. Instead it should be connected to the junction of R6/C47 & TR1 emitter in all circuits.

3. TR5 (BC158B) is PNP type instead of NPN type as shown by emitter in circuit diagram.

CIRCUIT DESCRIPTION

15RL412/00R

The main stages in this set include frequency changer, two I.F. amplifiers, detector diode and a 3-step AF amplifier. Band selection is achieved by changeover contacts a slide switch.

1. Frequency Converter

- (a) **DC condition.** The simplified diagrams for the different bands are given in figure for RF circuits. The DC conditions for TR1 (BF 194B) are satisfied by base resistor R5 and emitter resistance R6.)
- (b) **Aerial Section.** The stage is provided with a ferroceptor aerial for medium wave and a frame aerial for short waves. Normally an external aerial is not necessary, but when used, signal is nominally injected to the tuned circuit through a small value capacitor C4.

The aerial circuit is tuned for medium wave by S1/S1'-C5/C9. Here S1 and C5 are adjustable for tracking purposes. The aerial circuit for SW2 is tuned by S3/S3'-C6/C1/C9. Here again core of S3/S3' and C6 are adjustable for tracking. For SW1 aerial tuned circuit is composed of S6a-C3/C8-C2/C7-C9. Here C7 and C8 are used for alignment.

- (c) **Oscillator Section.** Simplified circuits for each band are given in figure for RF circuits. The oscillator is of the straight forward feedback type using the tank circuit between emitter and base. The tap on tank circuit coil takes care of proper matching. For SW bands fine tuning has been provided by the action of a variable resistor R1 in series with S5, which changes the net reactance across part of the oscillator coil.

2. IF Amplifier

The IF signal generated by TR1 is accepted through tuned IF transformer S14/S15 by proper load matching. The DC conditions for TR2 are set by base resistor R7 stabilized by C23 from a voltage divider chain, emitter resistance R8 decoupled by C24 and collector resistance R9 stabilized by C26. The amplified signal is fed to the tuned IF transformer S18/S19. The second IF amplifier TR3 (BF 195C) feeds the amplified IF signal to the last tuned transformer S20/S21.

3. Detector

The detector diode X1 (OA79) is kept conducting because its anode is returned via S22 and R15 to earth along the voltage divider chain R14-R15 between—4.9V and earth and its cathode is connected via R16 to a potential divider R7-R11-R17 between—4.8V and earth. The voltages are properly adjusted for satisfactory AGC operation.

4. AF Stage

The demodulation voltage after filtering by C31-R16/C32-R17 is fed to the volume control R20. The tone control action is provided by combination of C34-R19 and slight compensation is provided by C36 through part of R20 and physiological tone correction R18/C35.

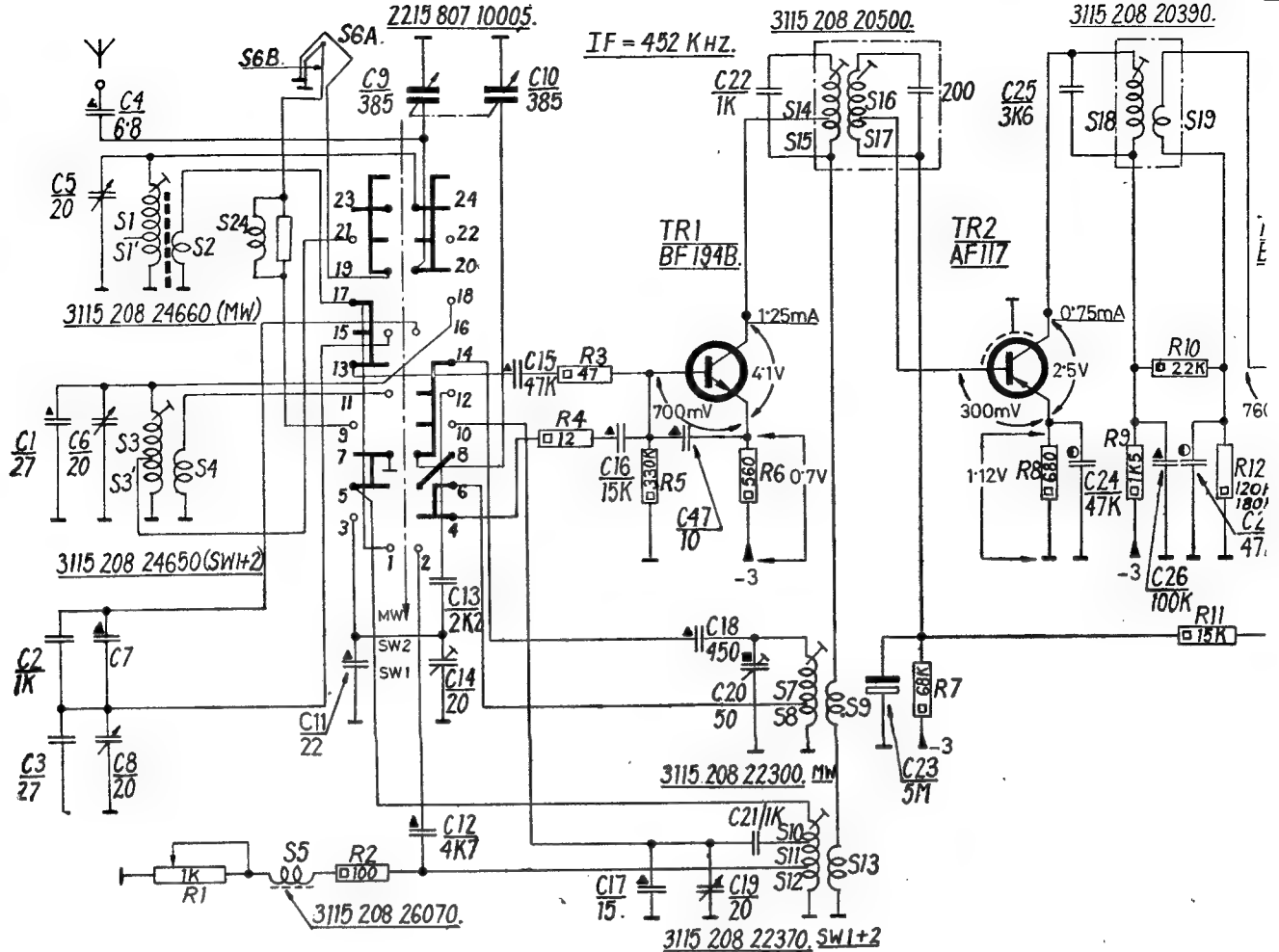
The DC conditions for first AF amplifier TR4 (CIL463) are adjusted by emitter resistance R23, collector resistance R22 and resistance R21 between collector and base. AC negative feedback is provided by means of C38 to suppress higher tones (as well as any residual IF).

The second stage of AF amplification TR5 (BC158B) is DC coupled to the final stage. The variable resistance R24 between collector and base of TR5 adjusts the balance of the power transistors.

The output stage contains a complimentary symmetry circuit with AC187 and AC188. The collector current of 5 mA of these transistors is adjusted by R25. The diode X2 (CD2) and NTC resistance R28 determine overall voltage stability to the biasing network. The final negative feedback from the loudspeaker points is applied to the emitter of TR4 through R26/C41-R33.

5. Power Supply Stage

The power supply section uses filter capacitors C43-C44. While the full voltage is applied to this output stage, reduced voltages after suitable filtering are fed to other stages. The external battery eliminator supply is connected to the power section through a suitable socket which cuts off the battery circuit automatically.



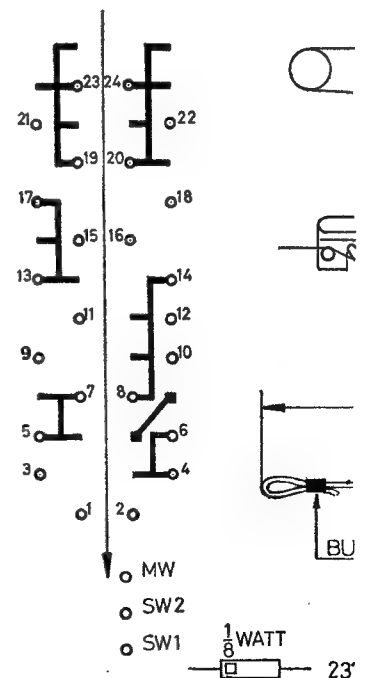
TRIMMING DATA

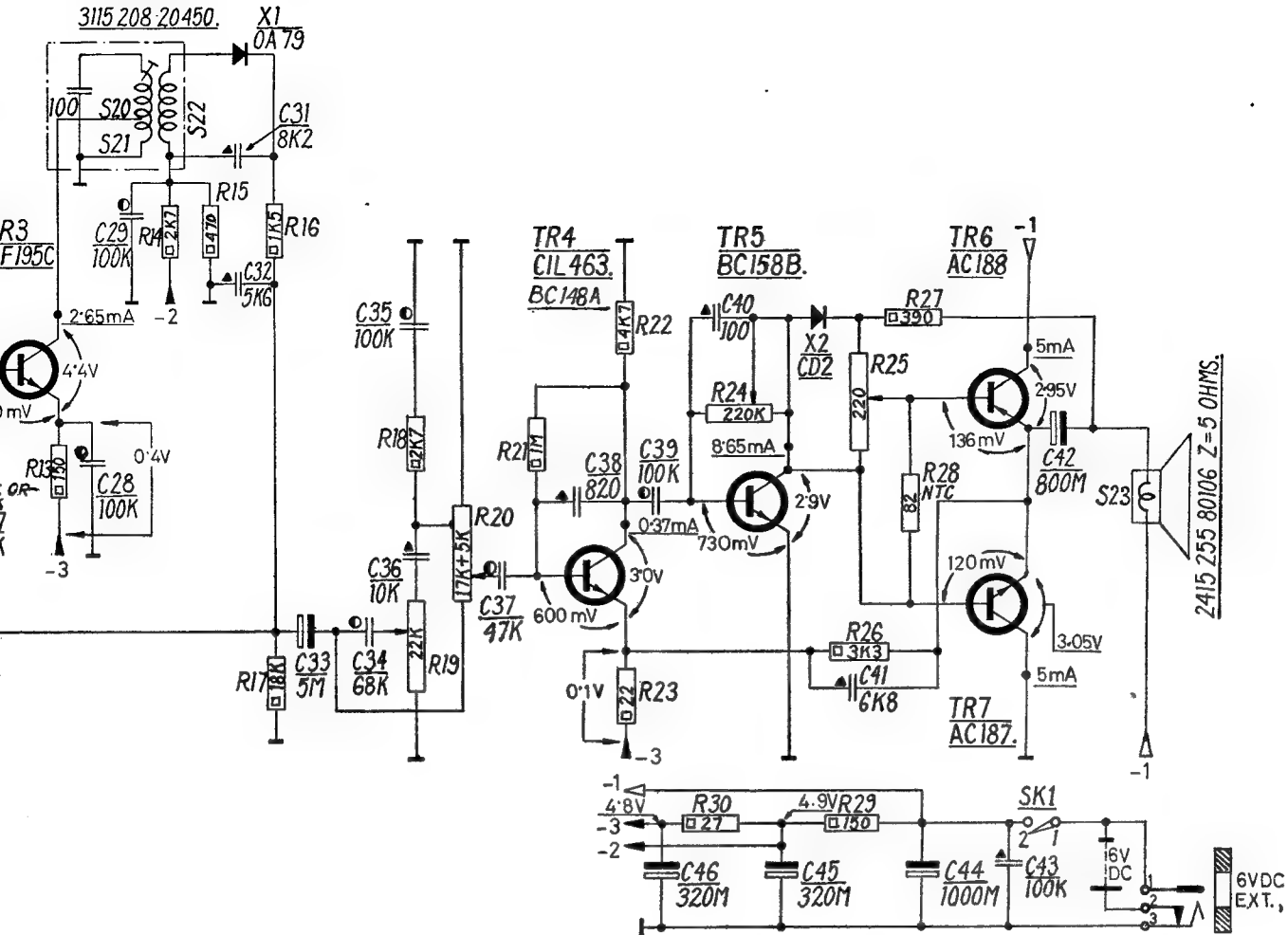
SR NO	WAVE RANGE	POSITION OF VARCO	TRIMMING FREQUENCY	ADJUST FOR MAX OUTPUT	REMARKS
1	MW	MAXIMUM	517KHz	S7,8,9.	
2	MW	MINIMUM	1622KHz	C20.	
3	SW1	MAXIMUM	9.3MHz	S10,11,12,13.	
4	SW1	MINIMUM	22.2MHz	C19.	
5	SW2	MINIMUM	7.5MHz	C14.	
6					REPEAT 1,2,3 & 4.
7	MW	TUNED	550KHz	S1,1',2.	
8		TUNED	1500KHz	C5.	
9					REPEAT 7 & 8
10	SW2*	TUNED	3.2 MHz	S3,3',4.	
11		TUNED	7.2 MHz	C6.	
12					REPEAT 10 & 11.
13	SW1*	TUNED	9.6MHz	C7.	
14		TUNED	17.8MHz	C8.	
15					REPEAT 13 & 14

* FOR TRIMMING SW THE BASE COUPLING SHOULD BE USED UP TO A LENGTH OF 40mm FROM THE EARTH END.

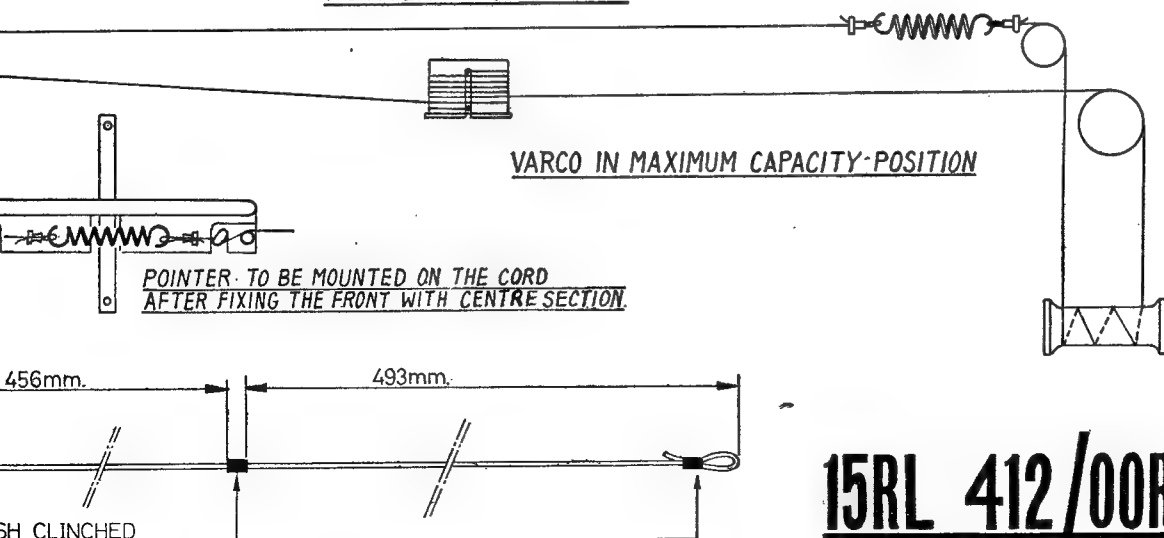
NOTE SK1 IS COUPLED WITH VOLUME CONTROL R20
 CONDENSER C7 SHOULD BE SELECTED FROM 130-220-270-330 and 390pf.
 BANDSWITCH DRAWN IN MW POSITION.
 CODE NUMBER OF S6A IS 3115 201 00990
 — do — S6B IS 3115 201 01000
 — do — S24 IS 3115 308 28011

BAND SWITCH





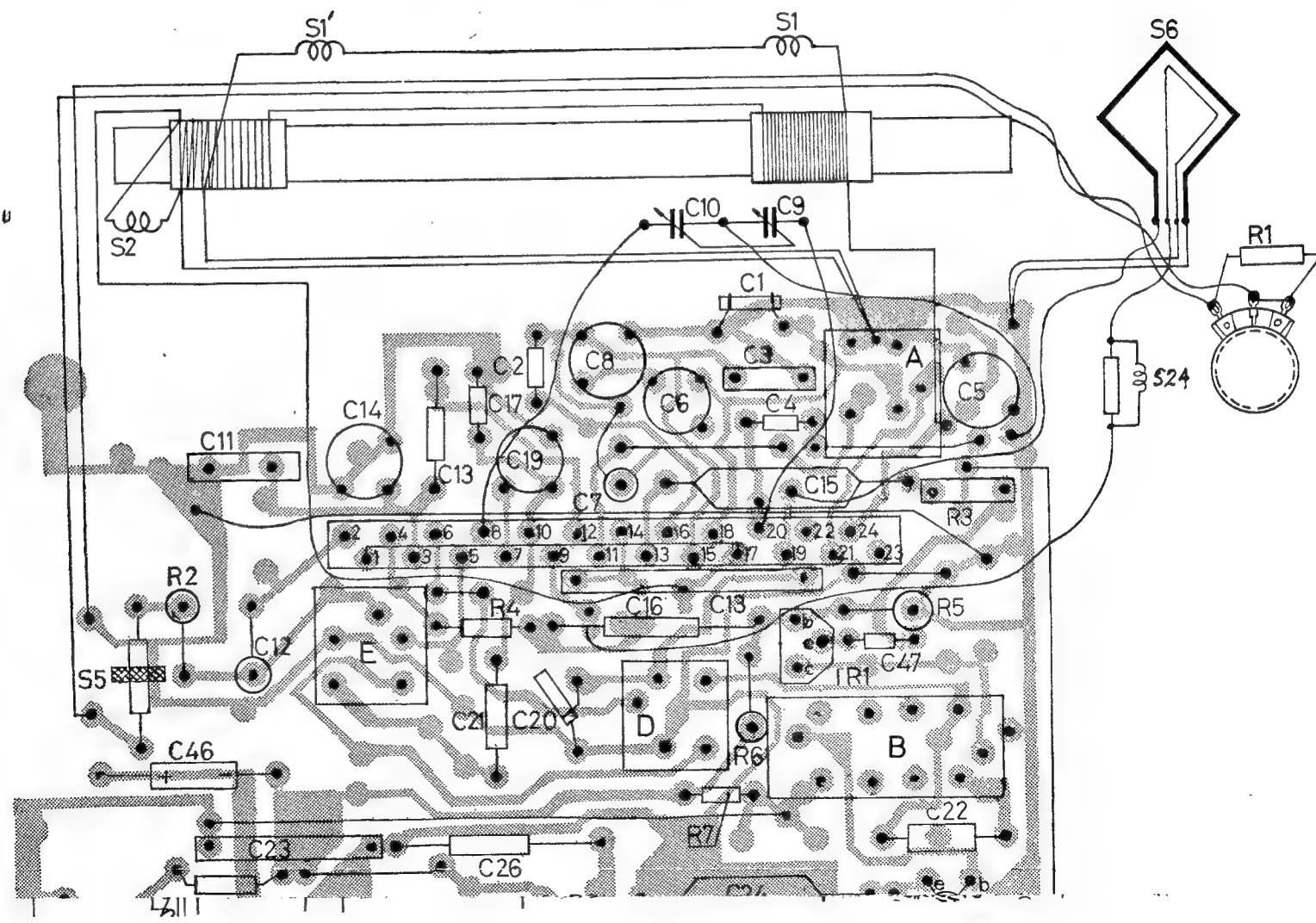
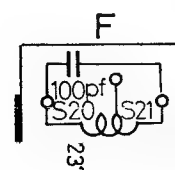
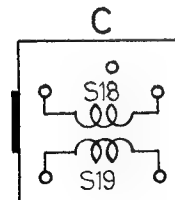
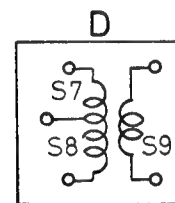
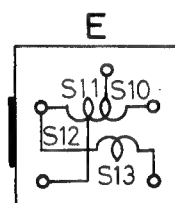
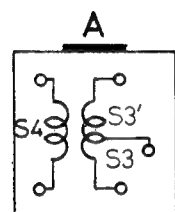
POINTER DRIVE SYSTEM.

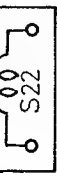


15RL 412/00R

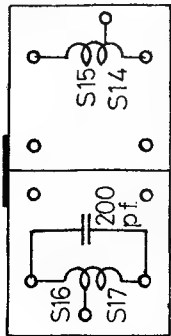
5 202 32--- 2215 551 00--- 2215 555 55--- 2215 311 31---

R	11,	15	30	16	21	19	13,9	23	10	6	8,	3	26,	1.						
R	14	2,	17	20	22	18	4,	24	12	29,7	25,27	28	5,							
C	33,	32,	46,11	12	36	28	14,37	38	21,39	17,20	40,8	16	6	10,24	1	4,9	15,	47	25	5,
C			35,29	23,34		31	13	26	2,19	27	7	45		18,44	3	43		41	22	42.
	S5,	S2,			S1' E, F, X1,		SK1,		D		C, S1	X2	3	A				S6A	S23,	
						TR3,	TR4,		TR5,		TR1,	TR6,TR7,	TR2.							

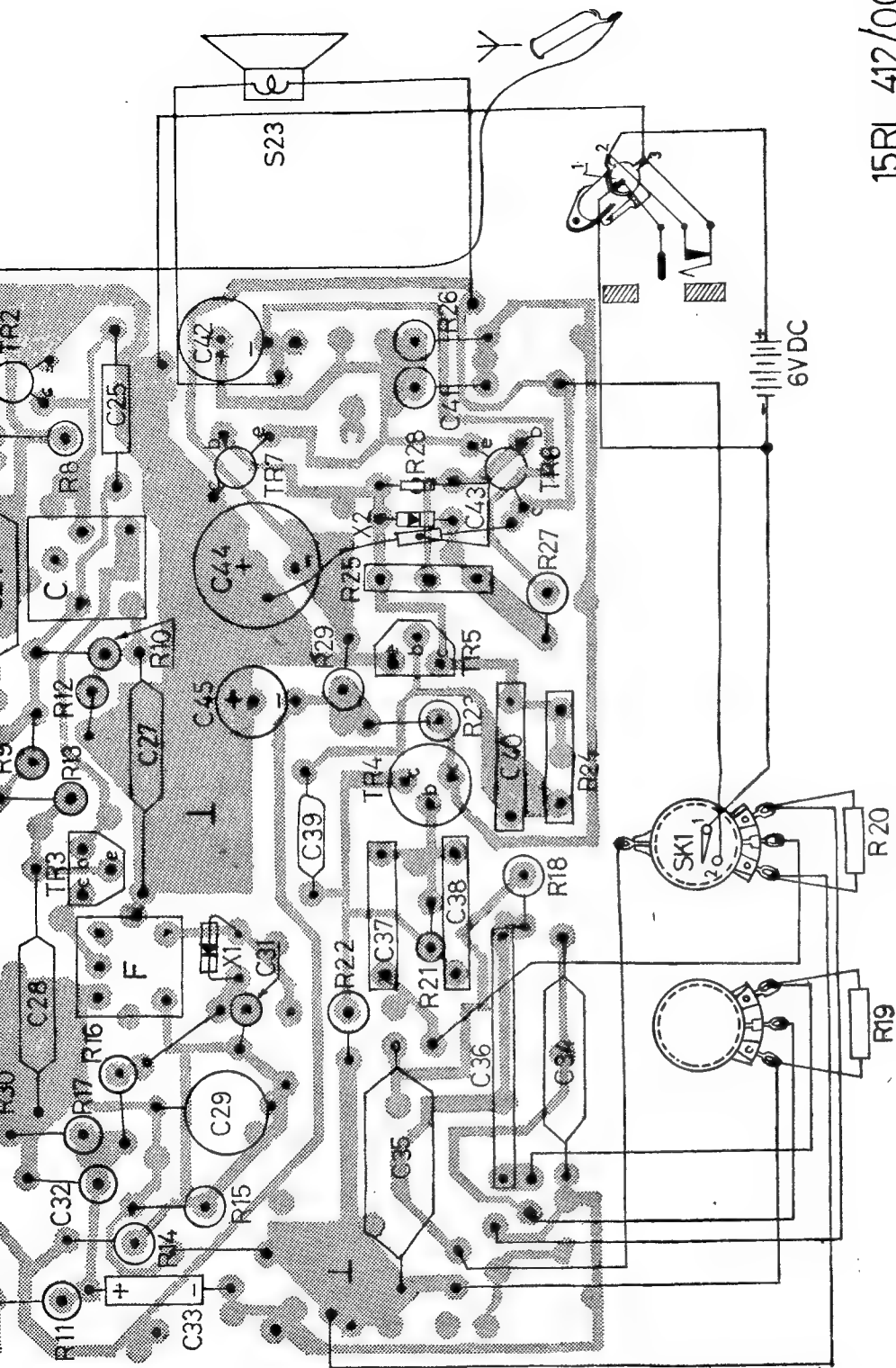




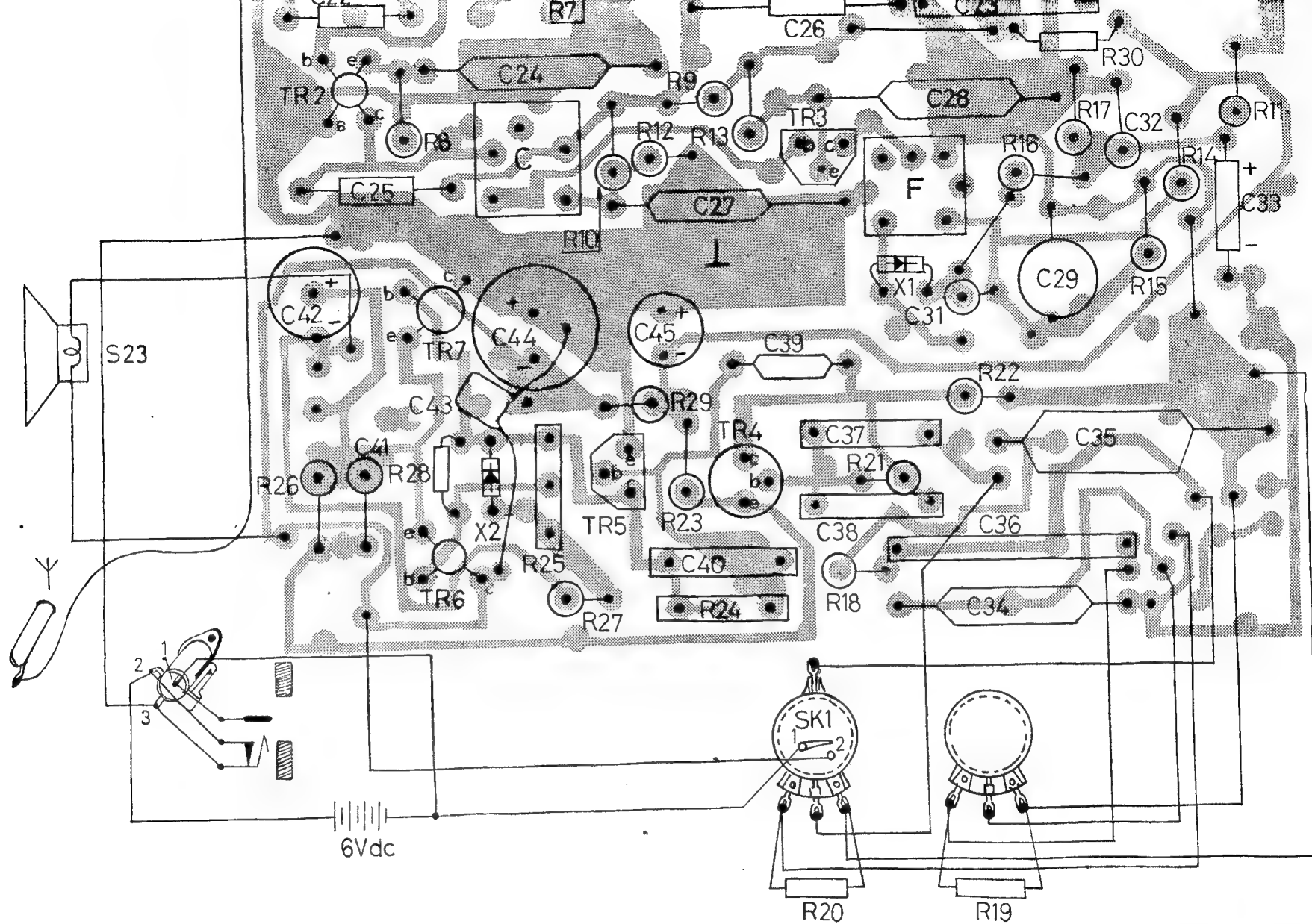
B



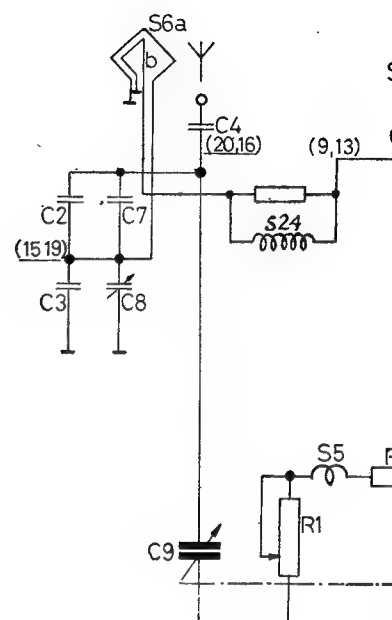
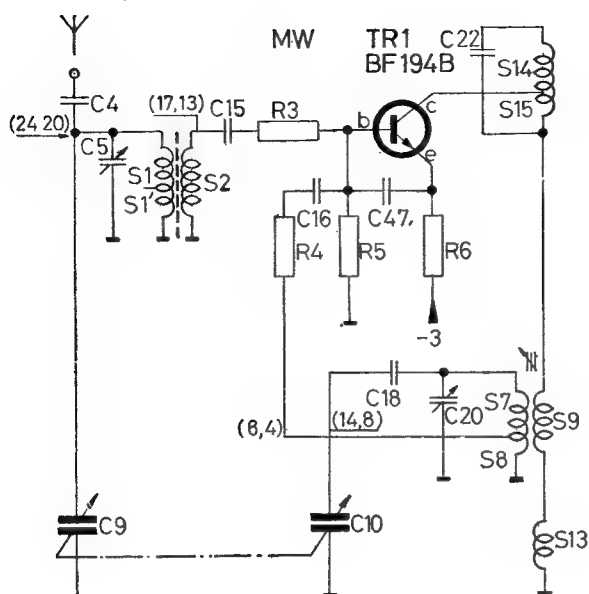
COIL DIAGRAMS DRAWN AS VIEWED FROM PRINT SIDE.

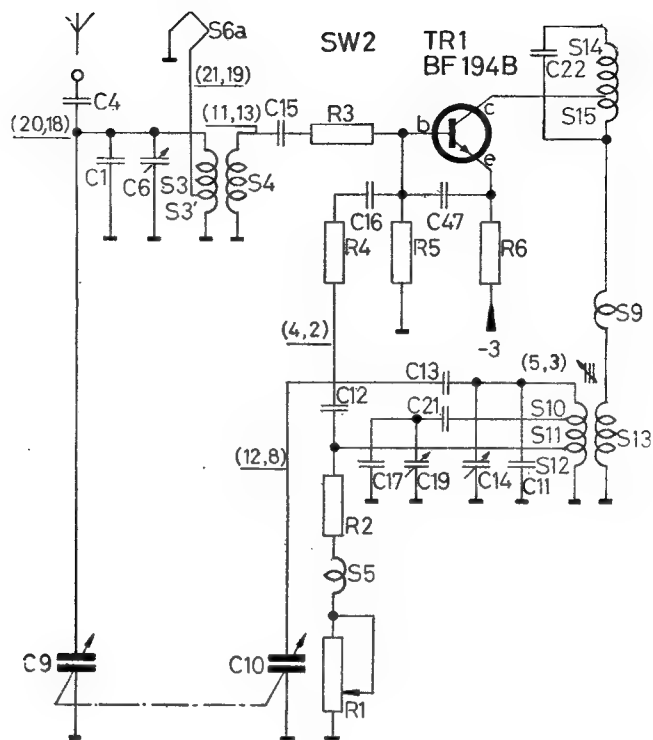
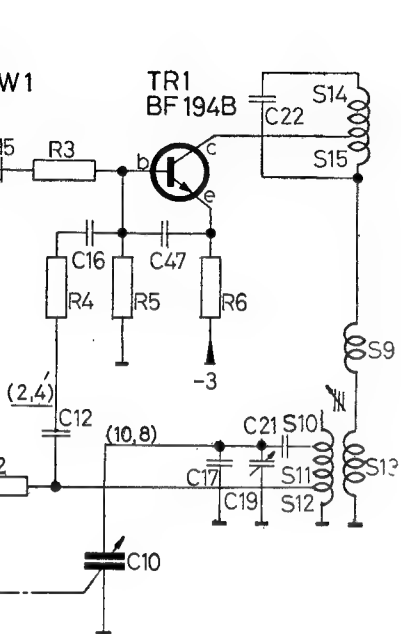


15RL 412/00R
PRINT VIEW



15RL 412/00R
COMPONENT VIEW





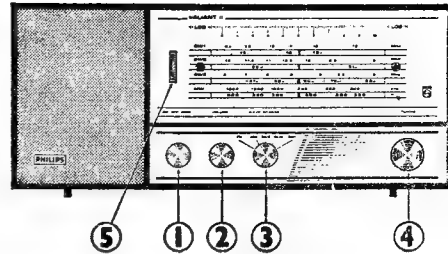
15RL412/00R

NOTE :—NUMBERS IN BRACKETS INDICATE SHORTING CONTACTS OF BANDSWITCH



PHILIPS Service manual

RADIO 15RB427



Year of release 1972

For AC Mains Supply

Waveranges

MW : 185 - 580 m (1622 - 517 Kc/s)
SW3 : 37 - 100 m (8.1 - 3.0 Mc/s)
SW2 : 24.8 - 33.2 m (12.1 - 9.0 Mc/s)
SW1 : 13.3 - 20.3 m (22.8 - 14.7 Mc/s)

Controls and Indicator

- (1) On/Off switch and tone control
- (2) Volume control
- (3) Waverange switch : PU-MW-SW3-SW2-SW1
- (4) Tuning
- (5) Tuning indicator

Valves and Dial Lamp

B1 : ECH 81 B4 : EM 84
B2 : EBF 89 B5 : EZ 80
B3 : ECL 82 L1 : 3115 208 01490

Loudspeaker

2415 255 80105 (5 ohms)

Consumtion

45 Watts approximately

Built-in-Aerial

Ferroceptor for MW and Plate Aerial for SW are provided

TRIMMING THE RECEIVER :—

Refer circuit diagram for trimming data

General

Adjust pointer to left mark 'A' with tuning condenser in minimum capacity position. Set the volume control to maximum and tone control to maximum treble. Connect an output meter to the external loudspeaker socket. Trim IF and RF circuits with lowest possible input signal as follows :

IF Circuits

Switch on the radio in MW position with tuning condenser in minimum capacity position. Screw out cores of S13/14. S15 as far as possible. Apply modulated 452 Kc/s signal to the grid (g1) of Valve B1 (ECH 81) through a capacitor of 33,000 pF and successively trim S16, S15, S13, S14 & S15 for maximum output.

RF Circuits

Apply signal to aerial socket via dummy aerial and trim for maximum output at frequencies shown in trimming data as follows :

- | | | |
|-------------------|--------------------|----------------|
| (1) MW — at C & B | (3) SW1 — at C & B | (5) SW2 — at B |
| (2) SW3 — at C | (4) SW3 — at B | |

Note : Circuit diagram for 15RB427 is identical to 15RB497.

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Cabinet	3115 108 02691	Bracket for fixing back plate	3122 997 10501
Back plate	3115 203 00061	Ring for Knob×4	3115 105 00351
Dial	3115 105 00711	Ornamental text plate	3115 105 10761
Knob (Tuning)	3115 108 02651	Gear wheel	3115 204 00491
Knob (Tone and volume)	3115 108 02661	Gear wheel	3115 204 00481
Knob (Waverange)	3115 108 02671	Spring for gear wheel	3111 111 00761
Pointer	3115 208 01951	Retaining ring for varco drum	2522 634 04005
Switch wafer. assy (Aerial)	3115 108 40231	Pulley (Tuning)	3122 794 39641
Switch wafer. assy (Oscillator)	3115 108 40241	Plate spring (Band switch)	3115 101 00161
Drum for gang condenser	3115 204 00141	Spring for coil (IF)	3115 201 00111
Grille for cabinet	3115 108 02701	„ for coil (large)	3115 201 00101
Emblem assy	3115 208 02161	„ for coil (small)	3115 201 00081
Mains cord	3115 201 01991	Bush for drive cord×4	3115 204 00901
Lamp holder	3115 100 10051	Socket plate assy	3115 208 06691
Spindle assy (waverange)	3115 108 02681	Screw for :	
Tuning spindle	3115 208 01431	Fixing dial	3115 208 01301
Spring for drive cord	3122 996 46821	Back plate	2515 123 89009
Wedge for fixing switch assy	3115 101 20811	Washer for :	
Ball (for Band switch)	2622 890 00817	Fixing dial	3115 200 40171
		Back plate	3115 200 40111

ELECTRICAL PARTS

Description	Code No.	Description	Code No.
Ferroceptor S2, S2A ...	3115 208 24332	C7 (130 pF) ...	2015 300 96002
S1, R1 ...	3115 208 24150	C8 (220 pF) ...	2215 555 55221
S3, S4 ...	3115 208 24220	C9 & C10 (488 pF) ...	2215 806 10012
S5, S6 ...	3185 208 24210	C11 (525 pF) ...	2215 555 96012
S7, S8 ...	3115 208 22030	C12 (25 pF) ...	2215 551 00013
S9, S9A, S10 ...	3115 208 22020	C13 (395 pF) ...	2215 555 96004
S11, S11A, S12 ...	3115 208 22040	C14 (30 pF) ...	2215 803 20001
S13, S14 ...	3115 208 22050	C15 (27 pF) ...	2215 555 55279
S15, S16 ...	3115 208 20040	C16 (130 pF) ...	2015 300 96022
S17, S18, S19 ...	3115 208 32070	C17 (50 pF) ...	2215 551 00014
S20 (Loudspeaker) ...	2415 255 80105	C18 (30 pF) ...	2215 803 20001
S21, S22, S23 ...	3115 208 30070	C19 (56 pF) ...	2215 555 55569
R2 (1M ohms) ...	2315 202 42105	C20 (100K pF) ...	2215 311 51104
R3 (15K ohms) ...	2115 104 04153	C21 (175 pF) ...	2215 551 00016
R4 (18K ohms) ...	2115 104 06183	C22 (3E3 pF) ...	2215 555 56338
R5 (33K ohms) ...	2315 202 62333	C23 (470 pF) ...	2215 555 55471
R6 (68 ohms) ...	2315 202 62689	C24 (10 pF) ...	2215 555 56109
R7 (100K ohms) ...	2315 202 62104	C25 (100 pF) ...	2215 555 55101
R8 (270K ohms) ...	2215 202 42274	C26 (100 pF) ...	2215 555 55101
R9 (1M5 ohms) ...	2215 202 32155	C27 (130 pF) ...	2015 300 96002
R10 (470K ohms) ...	2315 202 62474	C28 (220 pF) ...	2015 300 08221
R11 (82K ohms) ...	2315 202 62823	C29 (8K2 pF) ...	2215 555 02822
R12 (500K+1M7 ohms) ...	2315 350 13384	C30 (33 pF) ...	2215 563 55339
R13 (10M ohms) ...	2315 202 62106	C31 (3K3 pF) ...	2215 563 02332
R14 (750K ohms) × 2 ...	2315 202 62751	C32 (3K3 pF) ...	2215 563 02332
R15 (1K5 ohms) ...	2115 104 06152	C33 (25 mF) ...	2215 031 16259
R16 (220K ohms) ...	2315 202 42224	C34+C35 (32+32 mF) ...	2015 199 00002
R17 (3K3 ohms) ...	2315 202 42332	C36 (8K2 pF) ...	2215 561 06822
R18 (50K+420K ohms) ...	2215 353 13873	C37 (3K9 pF) ...	2215 561 96001
R19 (12K ohms) ...	2315 202 62123	C38 (220 pF) ...	2215 563 02221
C1 (25 pF) ...	2215 551 00013	C39 (22K pF) ...	2215 311 31223
C2 (30 pF) ...	2215 803 20001		
C3 (27 pF) ...	2215 555 55279	Temperature fuse in	
C4 (30 pF) ...	2215 803 20001	Mains transformer ...	3122 994 25530
C5 (27 pF) ...	2215 555 55279		
C6 (270 pF) ...	2015 300 96016		

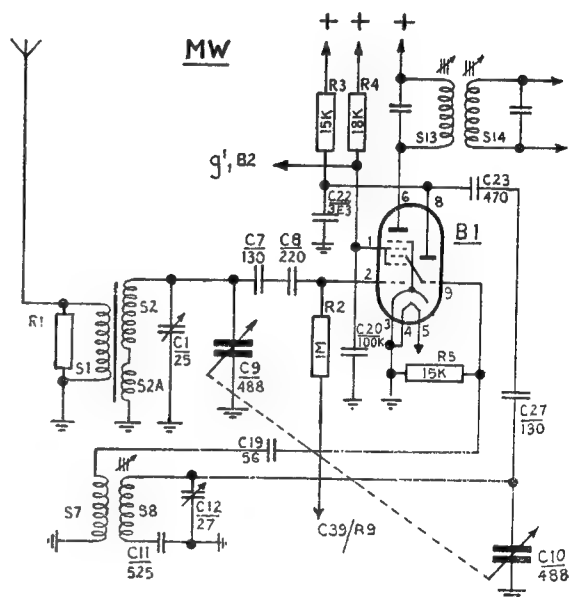
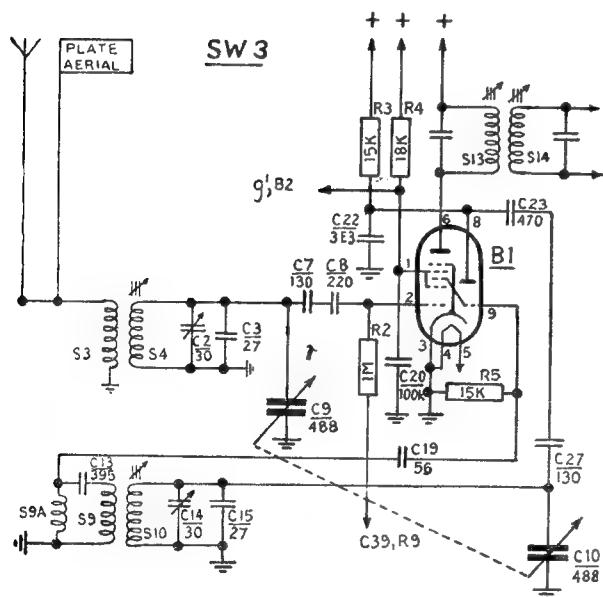
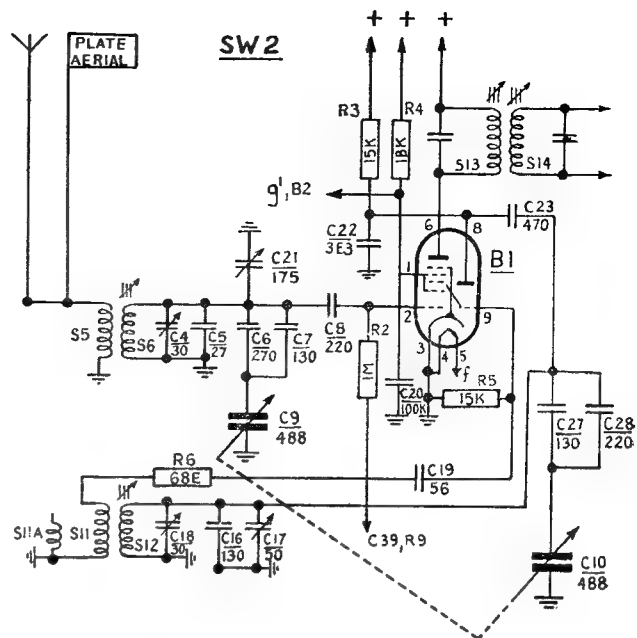
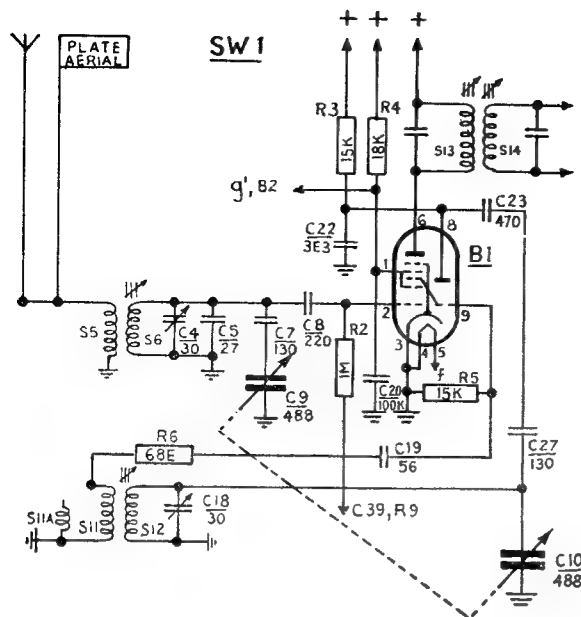
Instructions for removal of chassis from cabinet

1. Pull out 4 × knob.
2. Remove dial and position pointer tip out of nylon strings.
3. Remove back plate.
4. Unsolder loudspeaker and plate aerial connecting leads.
5. Remove magic eye holding bracket.
6. Remove 4 × screw (chassis holding) and 2 × screws (mains trafo supporting) from bottom of cabinet.
7. Pull out the chassis from cabinet carefully ensuring that dial lamp is also pulled out from its position when the chassis has come midway.

Instructions for encasing

1. Face the cabinet from its rear and position chassis slightly inside the cabinet. Then push the dial lamp to its position.
2. Direct the pointer through the gap between reflector and cabinet. Then push the chassis inside the cabinet and bring to a position so that side profile comes on respective grommet.
3. Position mains trafo supporting bracket and fix 2 × screws.
4. Keeping a support on chassis bring the cabinet to vertical position so that the chassis rest on mains trafo supporting bracket.
5. Fix 4 × screws to cabinet.
6. Bring cabinet to previous position, adjust to leads and position magic eye and fix the bracket.
7. Solder loudspeaker and plate aerial connecting leads.
8. Fix back plate.
9. Turn cabinet and position pointer in between the nylon string.
10. Fix dial.
11. Fix 4 × knob to its respective position.

RF CIRCUITS.

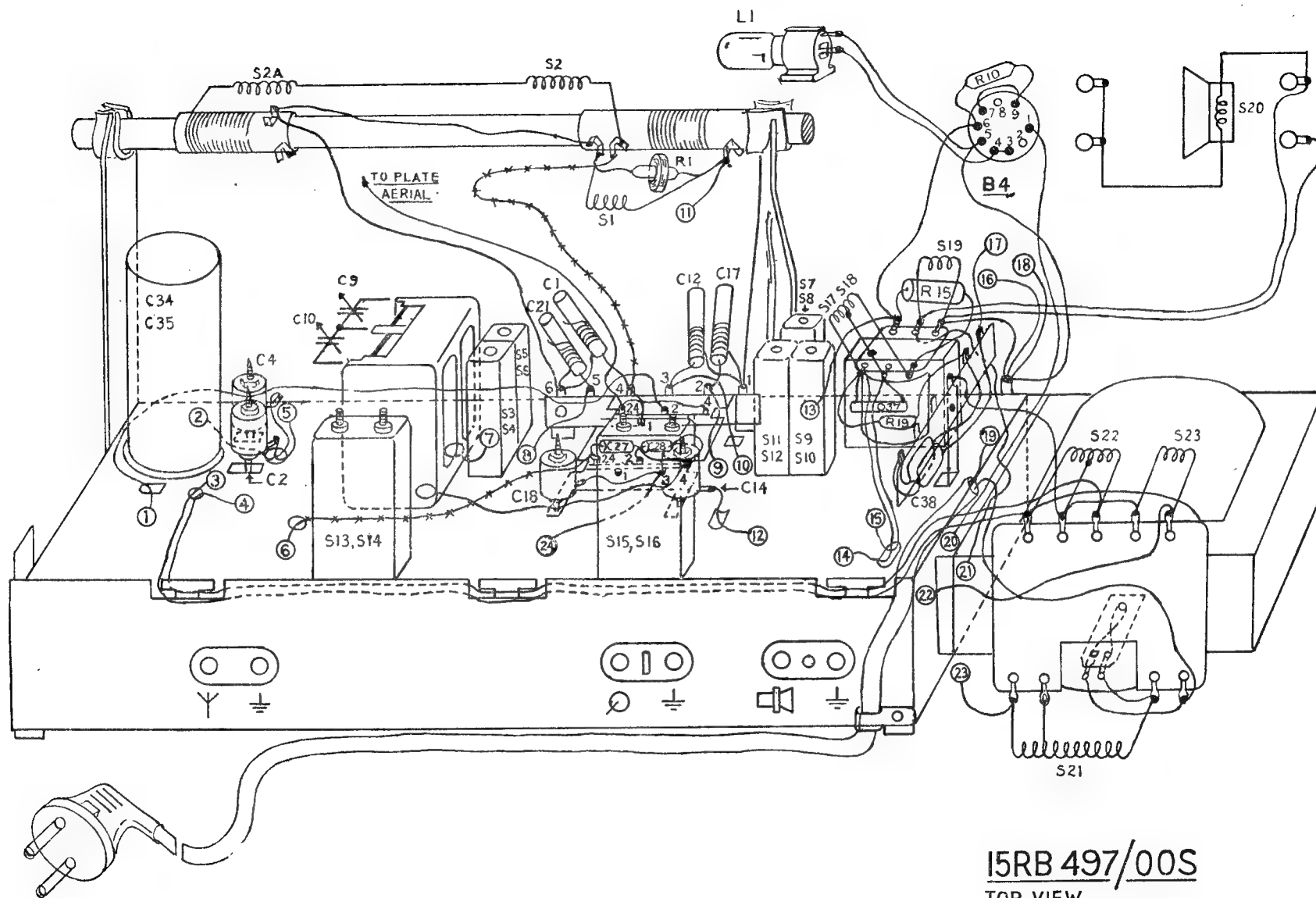


Note :—In the circuit diagram and R.F. circuits the value of R5 is shown as 15K ohms. It should be 33K ohms

During production the following modifications have been introduced :

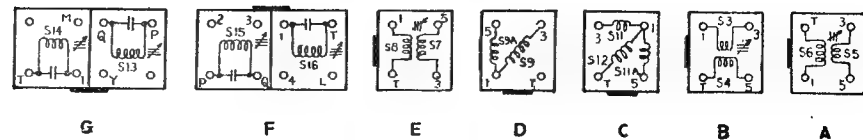
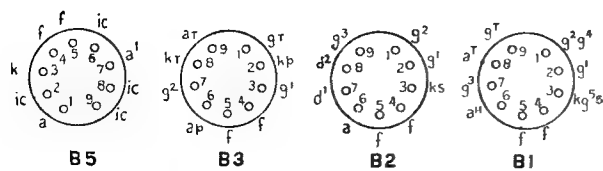
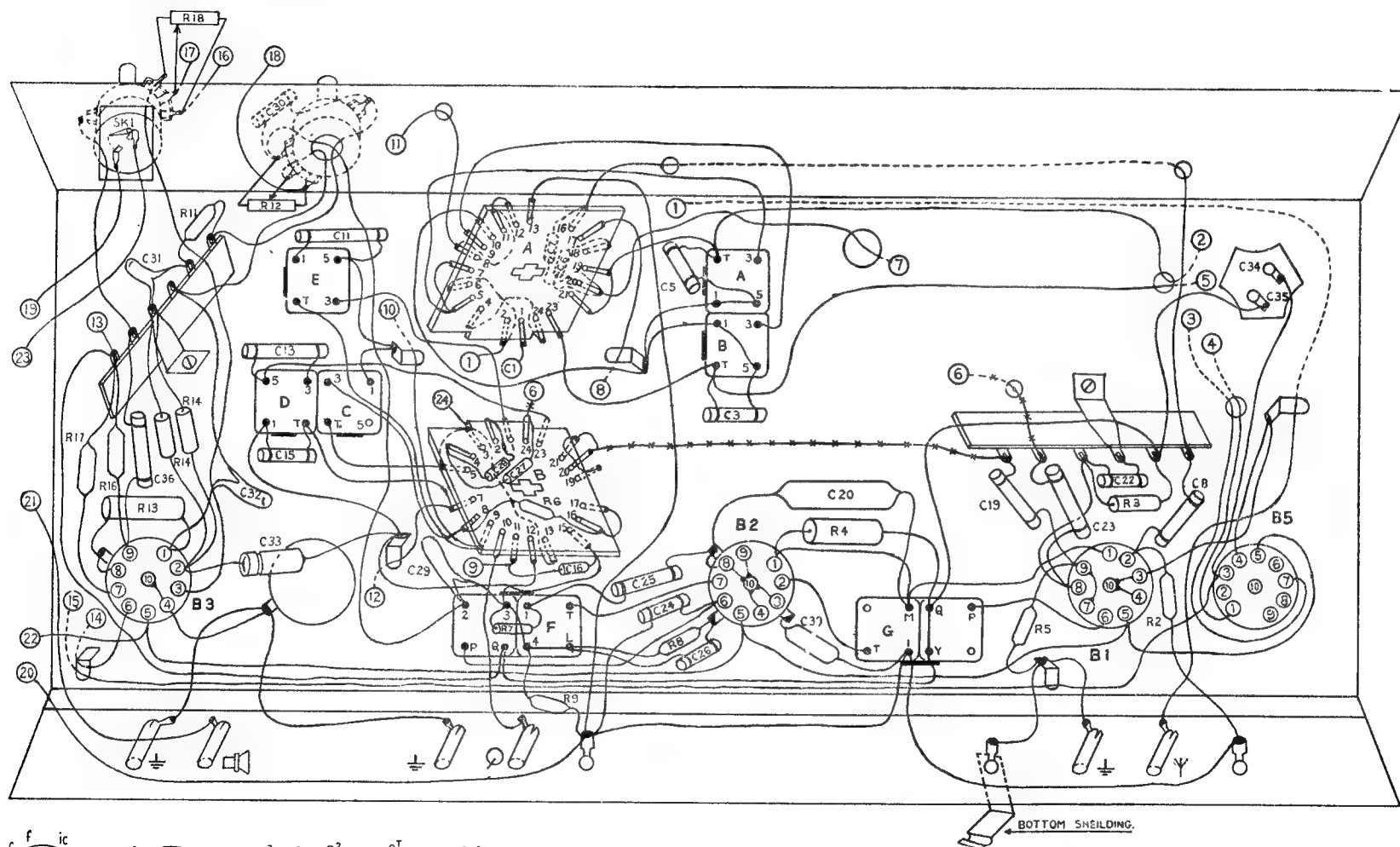
Part No.	Deleted	Added
R7	2315 202 62104	2315 202 62473
R20	—	2315 202 62123*

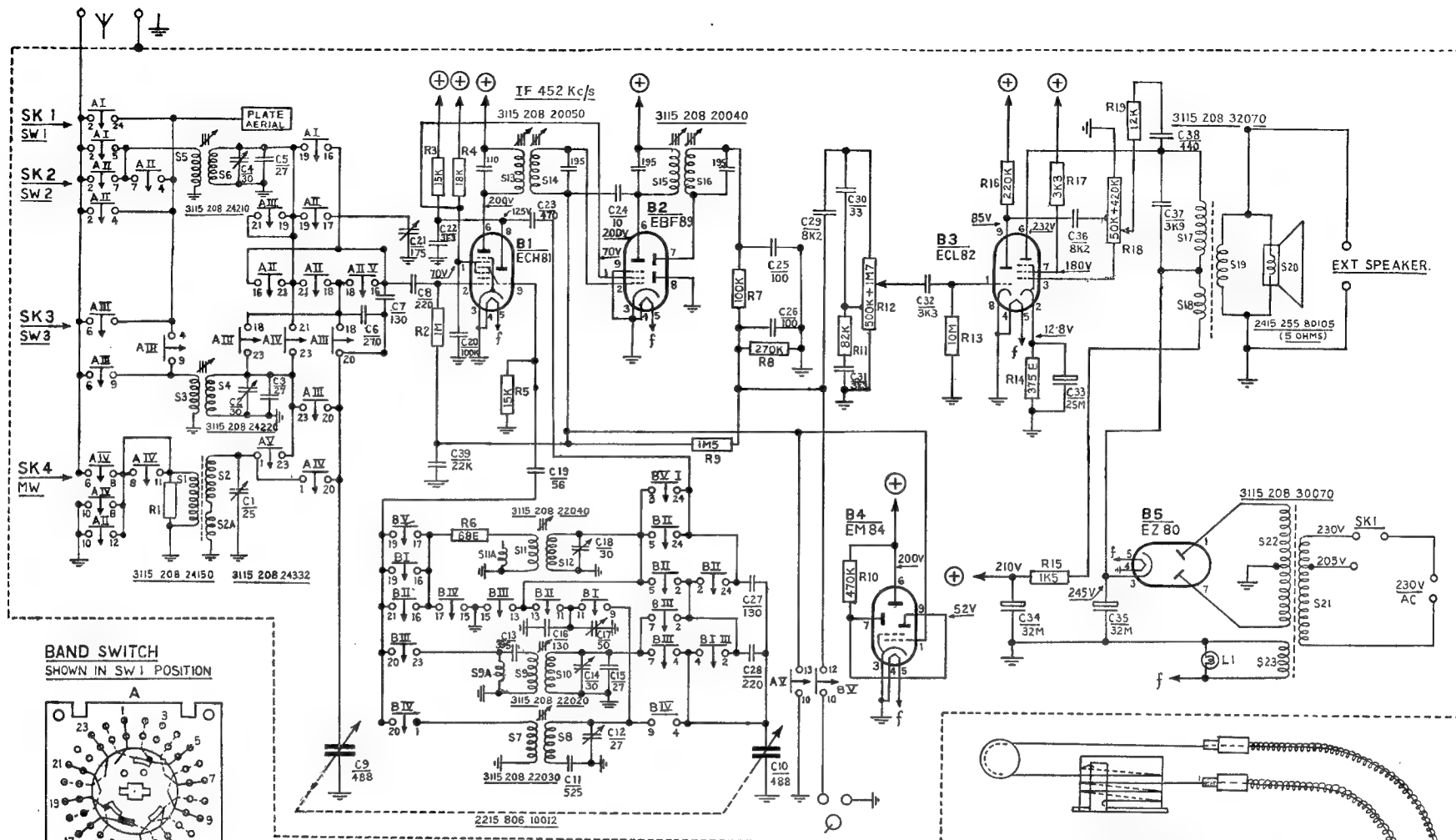
*12K ohms resistor in series with the grid of pentode section of valve ECL82.
Add capacitor value 27 pF across C21.



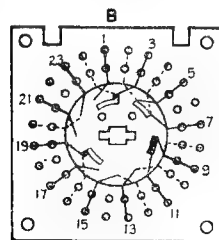
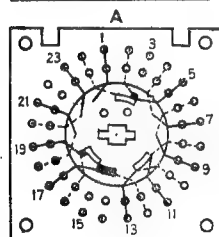
15RB 497/00S
TOP VIEW

S:	D E C			F			B A		G		
C:	31,36	15,32,33,30,13, 11,	29,	28,27, 7,6,16,	25, 24, 5,26,	3,	39,20,	19	23, 22,	8,	34, 35
R:	17, 16,	13, 14, 11,18,	12,	7, 6,9,	8,	4	5	3,	2,		





BAND SWITCH
SHOWN IN SW 1 POSITION

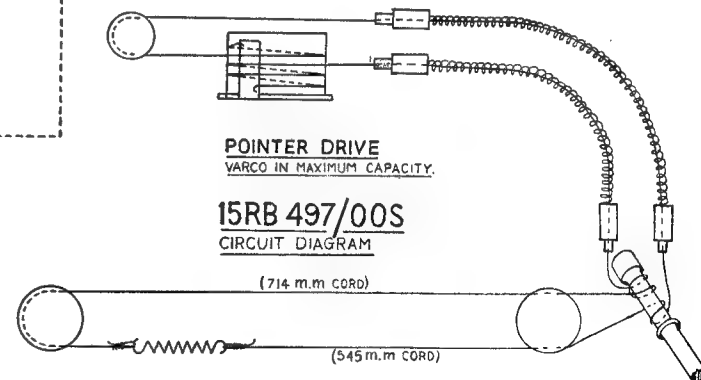


	SW 1	POS. I	SW 2	POS. II	SW 3	POS. III	MW	POS. IV	PU	POS. V
SKA	24-2-5	8-10	2-4-7	10-12	4-6-9		6-8-11		8-10-13	16-18
	16-19		16-18-21	17-19	18-20-23	19-21	20-1	21-23		23-1
SKB	24-3	2-4	24-2-5		2-4-7		4-9			10-12
	16-19	9-11	16-21	11-13	20-23	13-15	20-1	15-17	24-3	17-19

TRIMMING DATA

TRIMMING DATA

	A	B	C
MW	1500 Kc/s, C12, C1		560 kc/s, S7, S8, S2, S2A
SW3	17.6 Mc/s, C14, C2		3.32 Mc/s, S9, S10, S3, S4
SW2	11.9 Mc/s, C17, C21		
SW1	21.35 Mc/s, C18, C4		15.1 Mc/s, S11, S12, S5, S6

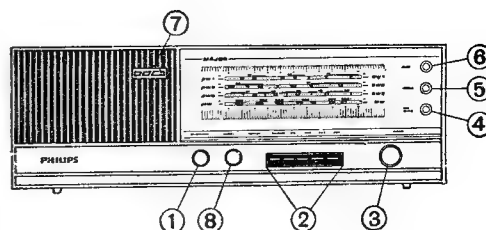


NOTE:
DSK1 IS COUPLED WITH TONE CONTROL R18
2) BAND SWITCH SHOWN IN CLOCKWISE SEQUENCE SW1, SW2, SW3, MW, & PU



PHILIPS Service manual

RADIO 15RB506/00



Year of release 1971

For AC Mains Supply

Waveranges

SW1 : 12.9 - 20.0 m (23.3 - 15.1 MHz)
SW2 : 24.4 - 31.5 m (12.3 - 9.5 MHz)
SW3 : 40.6 - 98.0 m (7.4 - 3.1 MHz)
MW : 185 - 580 m (1622 - 517 KHz)

Controls Knobs

1. On/Off switch and volume control (R26)
2. Wave-range selection and release
3. Tuning
4. Fine tuning (R6)
5. Treble control (R28)
6. Bass control (R30)
7. Tuning indicator (M)
8. Radio/Pick-up switch (SK2)

Transistors, Diodes & Dial Lamps

TR1 : BF194B	X1, X2 : OA79
TR2 : BF195C	X3 to X6 : DR25
TR3 : BF195D	X7 to X10 : 2415 265 00002
TR4 : BC148B/BC149C	L1 to L3 : CR 358 50
TR5 : AC126	(6.3V 115 mA)
TR6 : CIL461/BC107A	
TR7 & TR8 : AC187/01 and AC188/01	(matched pair)

Loudspeakers

2415 255 87005 (Z = 5 ohms)

Consumption

Approximately 45 mA at 230V A.C. supply at minimum volume.

Built-in-aerial

Ferroceptor for MW and plate aerial for SW.

Adjustment of collector current of output transistors :

Volume control at minimum. Include a milliammeter in the collector lead of TR7 to positive supply. At the supply voltage of 230 volts, adjust the meter reading to 15 ± 2 mA by means of R45.

TRIMMING THE RECEIVER :—

Refer circuit diagram for trimming data.

General

Replace the speaker by 5 ohms resistor, connect an output meter across the resistor. Adjust the pointer to its setting mark on dial in varco maximum capacity position. Adjust tone controls to maximum position. Trim IF and RF circuits with lowest possible input signal as follows :

IF Circuits

Band switch in MW position. Varco at 1500 KHz, Screw out as far as possible all the cores of IF coils. Apply modulated 452 KHz signal via 33 KpF condenser.

1. To base of TR3 : Trim S29/30/31 for maximum output
2. To base of TR2 : Trim S25/26 and S27/28 for maximum output
3. To base of TR1 : Trim S21/22 and S23/24 for maximum output.

RF Circuits

Apply signal via dummy antenna to aerial socket and trim for maximum output at frequencies according to trimming data.

Note—Oscillator frequency

for MW, SW3 and SW2 = Tuning frequency + IF
for SW1 = $\frac{1}{2}(\text{Tuning frequency} + \text{IF})$

15RB506/00

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Cabinet assy	... 3115 203 00081	Aerial socket	... 3115 200 20111
Front assy	... 3115 208 02111	Aerial plug	... 3115 208 03431
Front Grille	... 3115 205 10271	Spindle assy for P.U. control	... 3115 208 02341
Back plate	... 3115 203 00091	Drive pulley	... 3122 794 04951
Dial	... 3115 205 00261	Drive pulley (× 2)	... 3122 794 39641
Dial shade	... 3115 203 21031	Nail for fixing ornamental ring for leg	... 3115 200 40231
Pointer	... 3115 208 02281	Nut for fixing 16mm potmeter...	4322 047 00371
Reflector	... 3115 201 02721	Pick-up/Tape-recorder socket...	2422 026 00884
Leg (× 4)	... 3115 204 01721	Plug for P.U. socket	... 9.78/5 × 180
Ornamental ring for leg (× 2)...	3115 205 10301	Grommet for fixing :	
Knob (tuning)	... 3115 208 02131	Chassis (× 3)	... 3115 204 01821
Knob (PU/radio & volume/ on/off)	... 3115 208 02141	Printed Board (× 3)	... 3115 204 01651
Knob (treble/bass/fine tuning)...	3115 208 02121	Dial (× 3)	... 3115 204 01881
Button lever (wave-range) (× 4)	3115 204 01691	Screws for fixing :	
Button lever (release)	... 3115 204 01841	Backplate (× 3)	... 2522 113 02001
Emblem	... 3115 200 00021	Chassis (× 3)	... 2522 001 07188
Ornamental strip (bottom)	... 3115 205 10291	or	2522 001 07177
Ornamental strip (middle)	... 3115 205 10281	Leg (× 4)	... 2522 105 07031
Lamp-holder	... 3115 100 10051	Varco	... 2522 001 07076
Tuning spindle assy	... 3115 208 02241	Washers for fixing :	
P.U. switch	... 3115 208 02331	Backplate	... 3115 200 40111
Socket plate assy	... 3115 208 02251	Chassis (× 3)	... 2522 600 17027
or	3115 208 03361	Leg (× 4)	... 3115 200 40051
Mains cord	... 3115 208 50081	Spring for fixing :	
Drum for varco	... 3115 204 01831	Knob (treble/bass/fine tuning) (× 3)	... 2503 996 01001
Gear wheel for varco	... 3115 204 01861	or	3115 200 40291
Band switch (× 3)	... 3115 108 40211	Button lever (× 3)	... 3103 121 00001
Slide for band switch	... 3122 103 28241	Button lever (× 2)	... 3115 201 00461
Bracket for fixing back plate (× 3)	3115 101 21121	Drive cord	... 3122 201 00291
Bracket for fixing dial	... 3115 201 21201	Knob (P.U./volume/ tuning) (× 3)	... 3122 993 19131
Connecting piece for band switch (× 3)	... 3115 204 02871		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R6 (1000 ohms)	... 2315 380 74504	C19, C35, C40 (4K7 pF)	... 2215 563 02472
R26 (5K + 17K ohms)	... 2315 353 12582	C20 (1000 pF)	... 2015 361 31002
R28 (22K ohms)	... 2315 380 74528	C21 (5mF)	... 2215 001 18508
R30 (47K ohms)	... 2315 380 74509	C22 (345 pF)	... 2015 361 23451
R43 (33 ohms)	... 3115 109 10131	C25 (1K9 pF)	... 2015 361 31902
R45 (100 ohms)	... 2315 411 02201	C44; C48, C51 (80 mF)	... 2215 001 46809
C4 (1K pF)	... 2015 361 41002	C4 (200 mF)	... 2215 001 48508
C6, C8, C23, C30 (20pF)	... 2215 808 00006	C47, C50 (1500 mF)	... 2115 208 70111
or	2015 808 00101	C52 (4K7 pF)	... 2215 563 02472
C10, C12 (175 pF)	... 2215 551 00016	C55 (1500 mF)	... 2015 083 00152
C11 (2K2 pF)	... 2015 361 32202	C57 (6.4 mF)	... 2215 001 16648
C15 (50 pF)	... 2215 551 00014	C53, C56 (200 mF)	... 2215 001 44201
C17, C37 (4 mF)	... 2215 001 17408	M (tuning indicator)	... 3122 103 40601
or	2215 001 90011	L1, L2, L3	... 3115 109 10021

During production the following modifications have been introduced in this model:

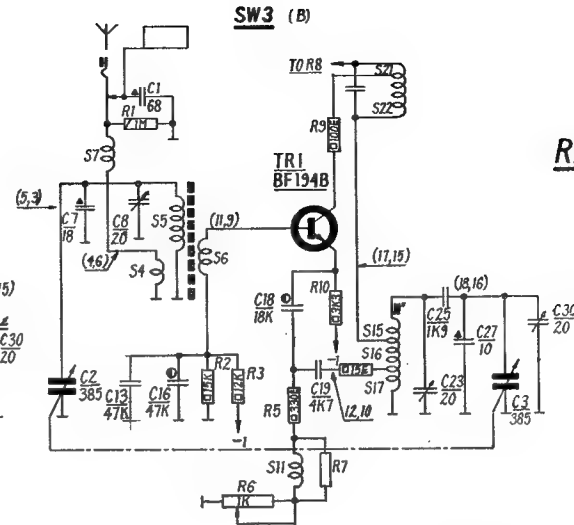
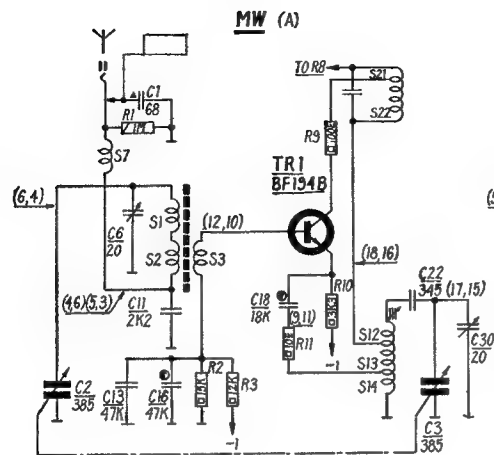
Part No.	Deleted	Added	Part No.	Deleted	Added
C1	2215 555 55689	2215 555 55479	R19	2315 202 32102	2315 202 32181
C31	2215 311 31473	2215 311 31104	R20	2315 202 32562	2315 202 32222
C35	2215 563 02472	2215 563 02682	R21	2315 202 32563	2315 202 32394
C38	2215 311 31153	2215 563 02222	R24	2315 202 32821	2315 202 32682
C39	2215 311 31224	2215 311 31223	R26	2315 202 12582	2315 353 14577
C41	2215 311 31104	2215 311 31473	R35	2315 202 32151	2315 202 32229
C43	2215 311 31224	2215 311 31104	R37	2310 202 32122	2315 202 32821
R8	2315 202 32332	2315 202 32102	R38	2315 202 32822	2315 202 32153
R13	2315 202 32473	2315 202 32124	R39	2315 202 32273	2315 202 32473
R14	2315 202 32222	2015 202 32681	R41	2315 202 32471	2315 202 32101
R15	2315 202 32272	2315 202 32562	S21}	3115 208 20351	3115 308 20051
R17	2315 202 32153	2315 202 32333	S24}		
			TR6	CIL461	AC187/01

- Note :—1. Two capacitors value of 15 KpF Code No. 2215 311 51153 added in series across S35. The junction of these connections is connected to the junction of rectifiers X4/X6.
- Switching arrangement on aerial socket is deleted.
 - One capacitor value 3K9 Code No. 2215 555 55392 is connected across SK1.
 - One resistor of value 5600 ohms Code No. 2315 202 32562 is added across condenser C11.
 - One resistor of value 68000 ohms Code No. 2315 202 32683 is connected from base of TR4 to negative (-1).
 - One resistor of value 1000 ohms Code No. 2315 202 32102 is included in series with base of TR6 (AC187/01).
 - One resistor of value 22 ohms Code No. 2315 202 32229 is included in emitter circuit of TR6 (AC187/01).
 - One resistor of value 1000 ohms Code No. 2315 202 32102 is connected to the earth terminal of potentiometer R28 after disconnecting it from earth. Other end of the same resistor is connected to negative (-1).
 - C41 connection is changed from R28 top tag to middle tag (variable point) and its earth connection is removed. The top tag of R28 is connected to junction of R26/C41.
 - Condenser C1 is connected from switch contact SW3-6 (B) to earth.
 - The following changes in mechanical parts :

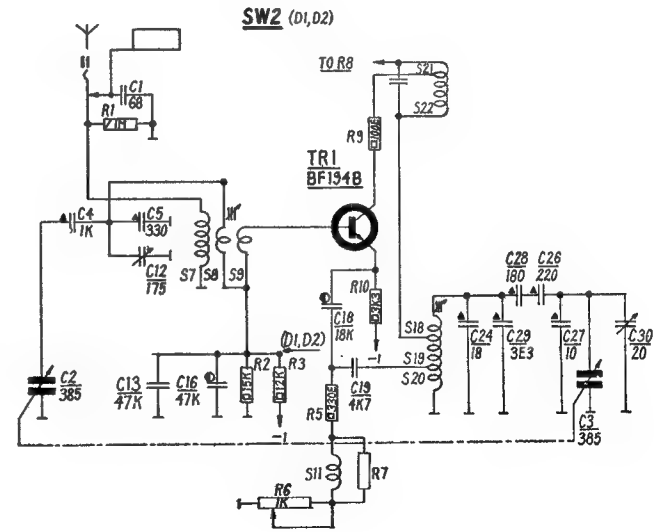
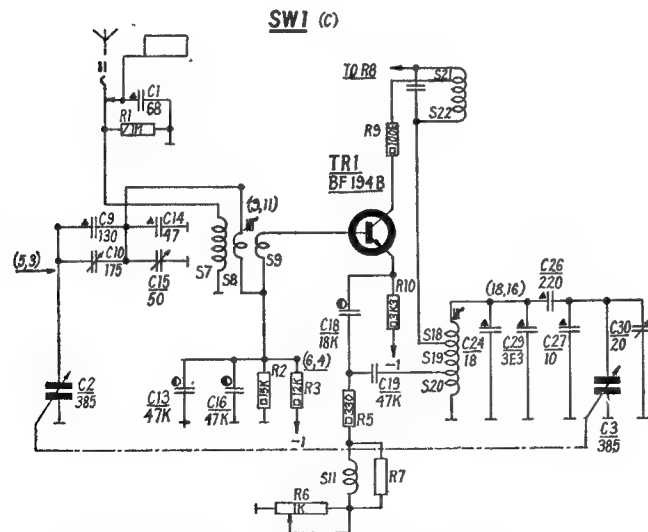
Description	Deleted	Added
Switch — Radio/P.U.	3115 208 02331	3115 209 00431
Spindle — Radio/P.U.	3115 208 02341	3115 208 03861
Knob — Radio/P.U.	3115 208 02141	3115 208 02142
Spring — For above knob	3122 993 19131	
Ring — For above knob	...	3115 101 00351
Socket assy— For Extn. L/s	...	2422 026 01017
Switch — For Extn. L/s	...	3115 201 03221
*Back Plate	3115 208 00091	3115 203 00191

(*The new back plate is suitable for fixing the extn. L/s socket.)

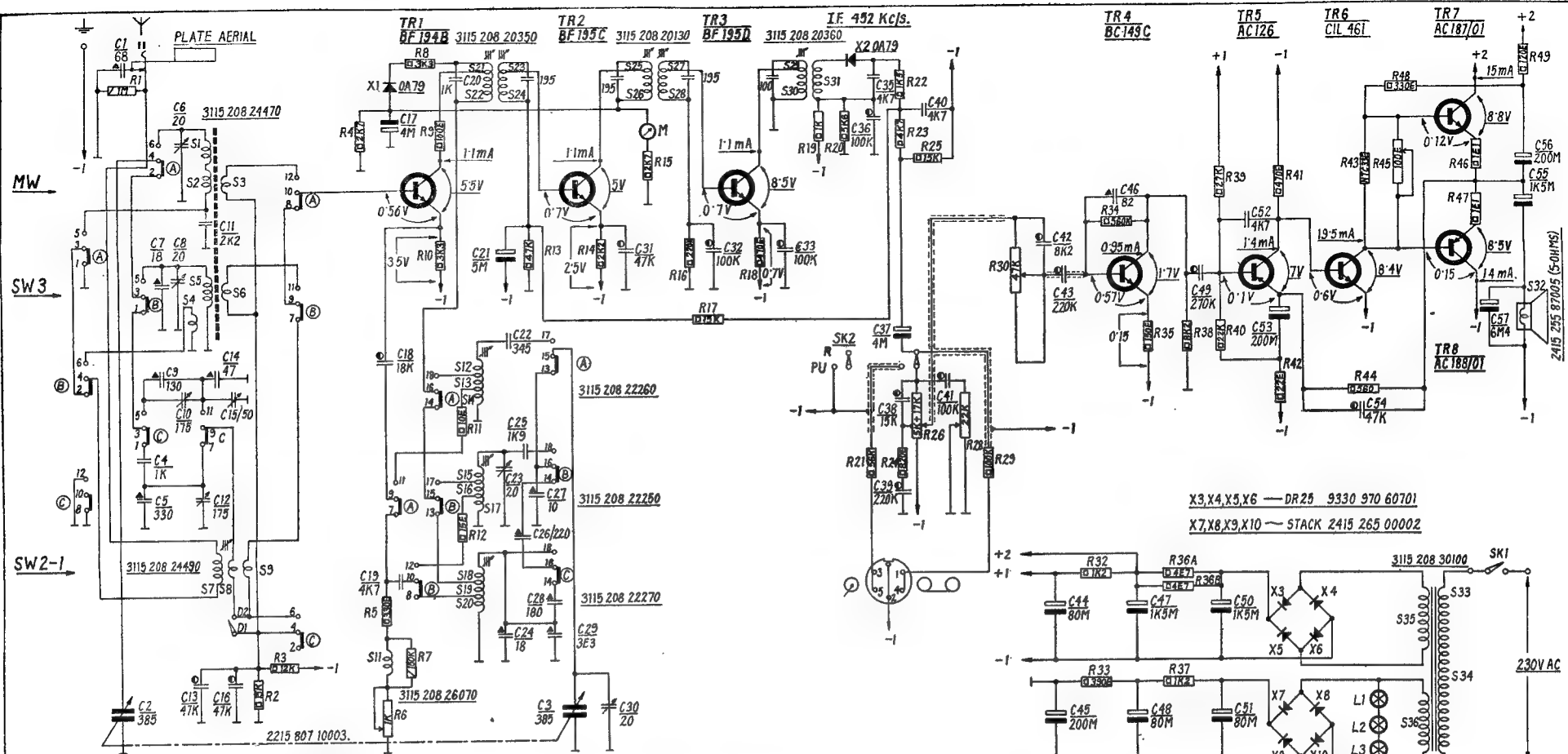
- Contacts of SW2 switch are deleted.



RF CIRCUITS. (15RB 506/00)



NOTE NUMBERS IN BRACKET INDICATE SHORTING CONTACTS OF BANDSWITCH.



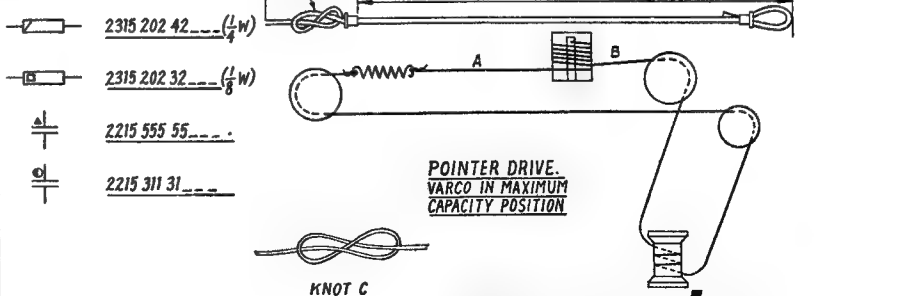
BAND SWITCH AS SEEN FROM PRINT SIDE
IN NON OPERATING POSITION.

TRIMMING DATA

WAVE	SR	POSITION OF	TRIMMING	ADJUST FOR
RANGE	NO	VARCO	FREQUENCY	MAXIMUM OUTPUT
MW	1	MAXIMUM	517 Kc/s	S12/13/14.
	2	MINIMUM	1640 Kc/s	C30
SW3	3	MAXIMUM	2.95 Mc/s	S15/16/17
	4	MINIMUM	7.5 Mc/s	C23
SW1	5	MAXIMUM	14.95 Mc/s	S18/19/20.
MW	6	TUNE	550 Kc/s	S11/12/13
	7	TUNE	1500 Kc/s	C6
SW3	8	TUNE	3.3 Mc/s	S5/36
	9	TUNE	7.2 Mc/s	C8
	10	REPEAT 6 TO 9	SCREW OUT CORE OF S7/8/9.	
SW2	11	TUNE	11.9 Mc/s	C12
	12	TUNE	9.6 Mc/s	S7/8/9.
	13	REPEAT 11 & 12	TURN C15 TO MIN. CAPACITY.	
SW1	14	TUNE	15.2 Mc/s	C10.
	15	TUNE	21.5 Mc/s	C15.

NOTE:- SK1 IS COUPLED WITH VOLUME CONTROL R26.

SYMBOLS.



15RB 506/00
CIRCUIT DIAGRAM.

2nd IF - 3115 208 20132 221

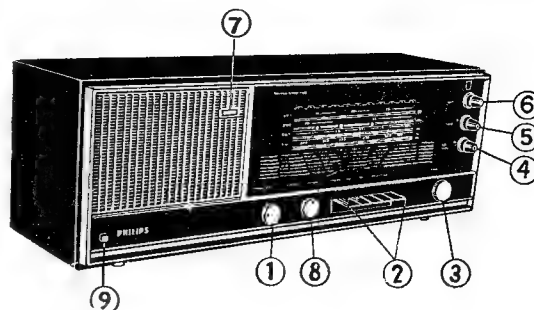
118d11 208 20362 4871

2nd IF - 3115 208 20351 211



PHILIPS Service manual

RADIO 15RC509/01S



Year of release 1971

For 9 Volts Battery Supply

Waveranges

SW1 : 13.5 - 20.3 m (22.8 - 14.8 Mc/s)

SW2 : 24.6 - 33.3 m (12.2 - 9 Mc/s)

SW3 : 37.5 - 100 m (8 - 3 Mc/s)

MW : 185 - 580 m (1622 - 517 Kc/s)

Control Knobs

- (1) On/Off switch (rotary) and volume control
- (2) Wave range selection and release push buttons
- (3) Tuning
- (4) Fine tuning
- (5) Treble control
- (6) Bass control
- (7) Tuning indicator
- (8) Radio/Pickup switch
- (9) Dial light switch

Transistors and Diodes

TR1 : BF194B TR7/TR8 : AC187/01 and
TR2 : BF195C AC188/01 (pair)
TR3 : BF195D X1, X2 : OA79
TR4 : BC148C X3/X4 : DS10
TR5 : AC126 L1, L2 : 3115 109 10020
TR6 : BC107A/BC147A

Loudspeaker

2415 255 87005 (Z=5 ohms)

Batteries

Eveready type 1050 or equivalent

(6 × 1.5 volt cell) or battery pack type 286

Consumption

Approximately 18 — 28 mA in minimum position of volume control

Built-in-aerial

Ferroceptor for MW and frame aerial for SW are provided.

Adjustment of collector current of output transistors

Include milliammeter (DC 10 mA range) in the collector lead of TR7 to positive supply. Adjust the current at minimum position of volume control, and 9 volts battery supply to 5.0 mA by means of potentiometer R40.

TRIMMING THE RECEIVER :—

Refer circuit diagram for trimming data.

General

Replace the speaker with 5 ohms resistor. Connect an output meter across the resistor. Adjust the pointer to pointer setting mark Δ on dial in varco maximum capacity position. Adjust tone controls to Bass-minimum and treble minimum. Trim IF and RF circuits with lowest possible input signal as follows :

IF Circuits

Switch on the receiver to MW with varco in minimum capacity position. Screw out all the cores of IF coils. Apply modulated signal of 452 Kc/s via 33 KpF condenser :

- (1) To base of TR3. Trim S29/S30 for maximum output
- (2) To base of TR2. Trim S25/26 and S27/28 for maximum output
- (3) To base of TR1. Trim S21/22 and S23/24 for maximum output

RF Circuits

Apply signal via dummy antenna to aerial socket and trim for maximum output at frequencies according to trimming data

MECHANICAL PARTS

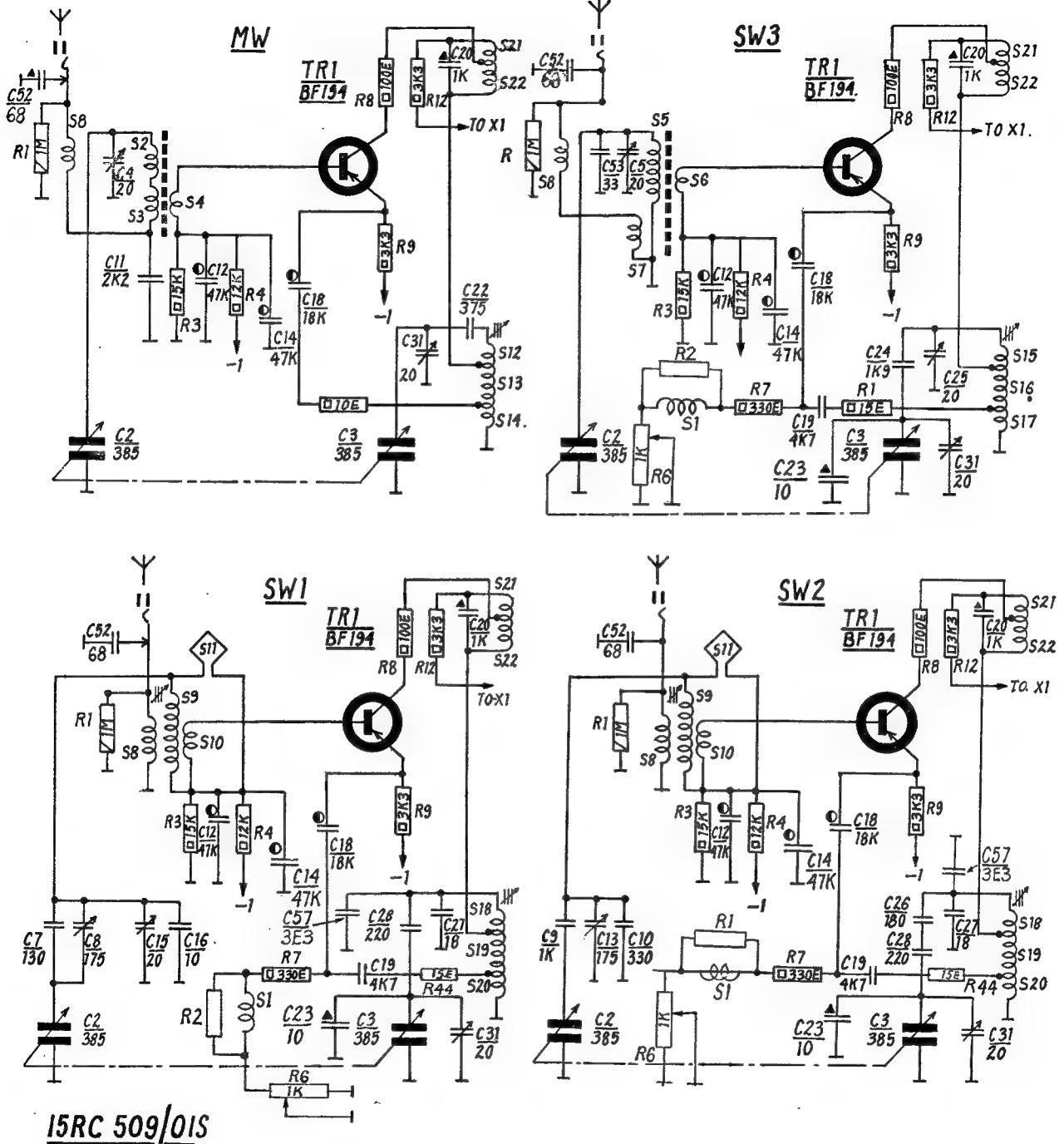
Description	Code Number	Description	Code Number
Cabinet assy	3115 203 00081	Gear wheel for varco	3115 204 01860
Front assy	3115 208 03450	Band switch × 3... ..	3115 108 40210
Front grille	3115 205 10271	Slide for band switch	3122 103 28240
Back plate	3115 203 00101	Bracket for fixing backplate ...	3115 101 21120
Dial	3115 205 00270	Ornamental bracket for fixing dial...	3115 201 21200
Dial shade	3115 203 21031	Connecting piece for band switch×3	3115 204 02870
Pointer	3115 208 02281	Spindle assy for P. U. control ...	3115 208 02341
Leg × 4... ..	3115 204 01720	Bush for dial lamp button ...	3115 204 03371
Ornamental ring for leg×2 ...	3115 205 10300	Screws for fixing : Backplate × 3 ...	2522 113 02001
Knob (Tuning)	3115 208 02131	Chassis × 3 ...	2522 001 07177
Knob(P.U./Radio & Volume & On/off)	3115 208 02141	Leg × 4 ...	2522 105 07031
Knob (Treble/Bass/Fine tuning) ...	3115 208 02121	Gear wheel/Varco	2522 001 07076
Button (Dial light)	3115 204 03361	Drive pulley	3122 794 04950
Button lever (Wave range) × 4 ...	3115 204 01690	Drive pulley × 2	3122 794 39640
Button lever (Release)	3115 204 01840	Washers for fixing : Backplate ...	3115 200 40110
Reflector	3115 209 00131	Chassis ...	2522 600 17027
Emblem... ..	3115 200 00040	Leg	3115 200 40050
Ornamental strip (Bottom) ...	3115 205 10291	Grommet for fixing : Chassis × 3 ...	3115 204 01821
Ornamental strip (Middle) ...	3115 205 10430	Printed board	3115 204 01651
Battery box assy	3115 208 02711	Dial × 3 ...	3115 204 01880
Lid for battery box	3115 204 01711	Spring for fixing :	
Holder for battery box	3115 201 00571	Knob (Treble/Bass/Finetune) ...	3115 200 40290
Clamp for battery holder	3115 201 21340	Knob (Vol. control/P.U. radio/Tuning	3122 993 19130
Socket for battery box	3115 208 02700	Button lever × 3	3103 121 00001
Lamp holder	3115 100 10050	Button lever × 2	3115 201 00460
Tuning spindle assy	3115 208 02241	Drive cord	3115 201 00290
P. U. Switch	3115 208 02330	Nail for fixing ornamental ring for leg	3115 200 40231
Socket plate assy... ..	3115 208 03360	Nut for fixing 16 mm potmeter ...	3115 200 40260
Cord with plug	3115 100 20110	Contact for SW2	3115 201 60520
Drum for varco	3115 204 01830	Spring for Sw2	3115 201 00440

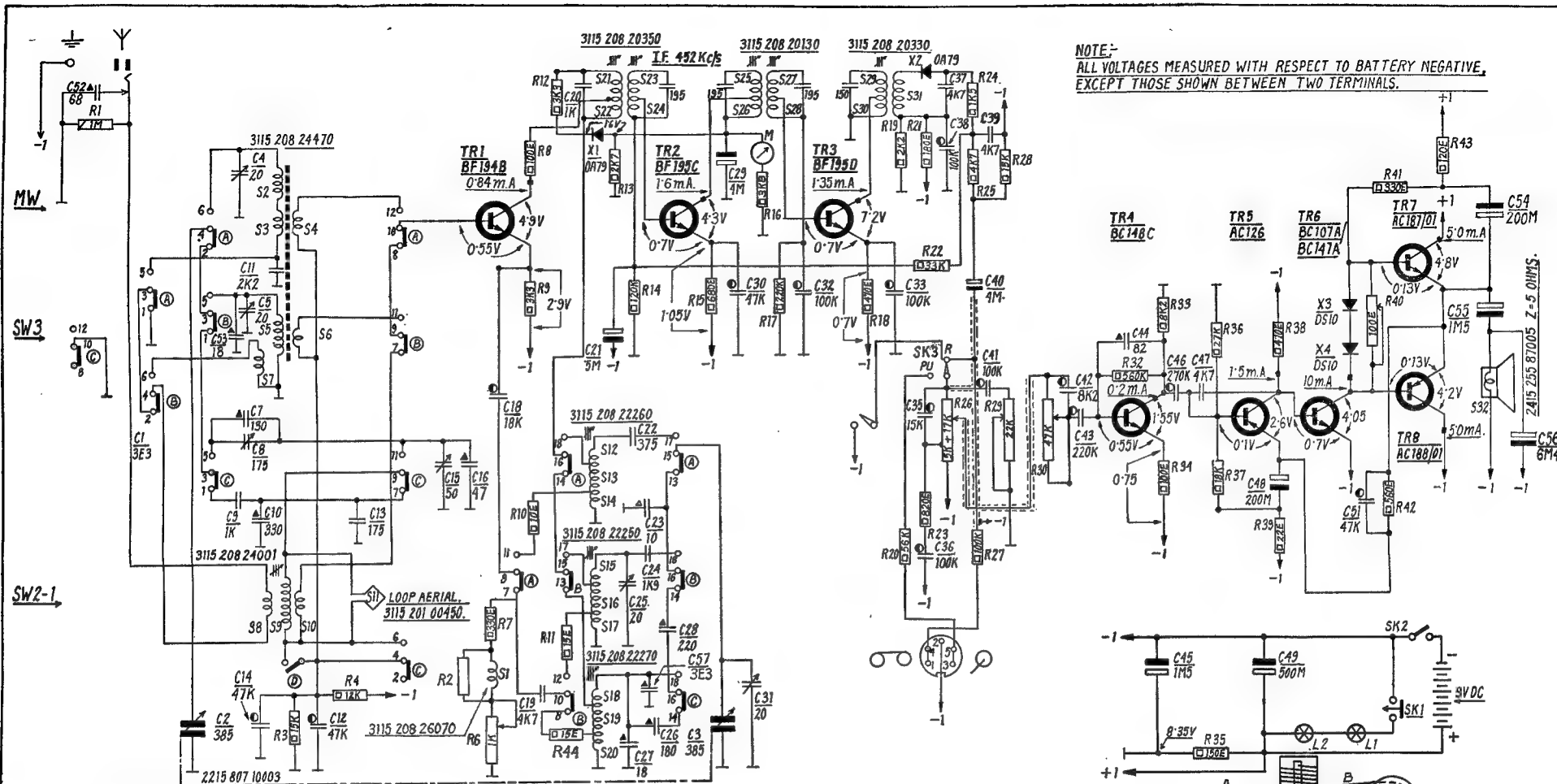
ELECTRICAL PARTS

Part No.	Code Number	Part No.	Code Number
M (Tuning Indicator) ...	3122 103 40600	C11 (2K2) ...	2015 361 32202
L1/L2 ...	3115 109 10020 (CR 358 50)	C19, C37, C39, C47 (4K7)	2215 563 02472
R6 (1000 ohms) ...	2315 380 74508	C21 (5 mF) ...	2222 001 18508
R26 (17K+5K ohms) ...	2315 353 12582	C22 (375 pF) ...	2015 361 23751
R29 (22K ohms) ...	2315 380 74528	C24 (1K9 pF) ...	2015 361 31902
R30 (47K ohms) ...	2315 380 74509	C29, C40 (4 mF) ...	2215 001 90011
R40 (100 ohms) ...	2315 411 02201	C45 (1500 mF) ...	3115 208 70111
C4, C5, C25, C31 ...	2215 808 00101	C48, C54 (200 mF) ...	2222 001 44201
C15 (50 pF) ...	2215 551 00014	C49 (500 mF) ...	3115 208 70130
C8, C13 (175 pF) ...	2215 551 00016	C55 (1500 mF) ...	2015 083 00152
C9, C20 (1K) ...	2015 361 31002	C56 (6M4) ...	2215 001 90007

For code number of other electrical parts refer circuit diagram.

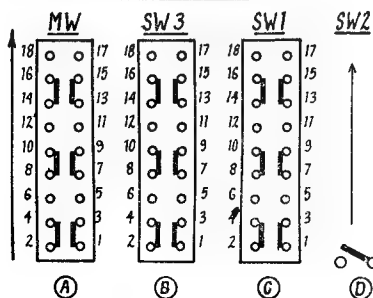
RF CIRCUITS.





NOTE:-
ALL VOLTAGES MEASURED WITH RESPECT TO BATTERY NEGATIVE,
EXCEPT THOSE SHOWN BETWEEN TWO TERMINALS.

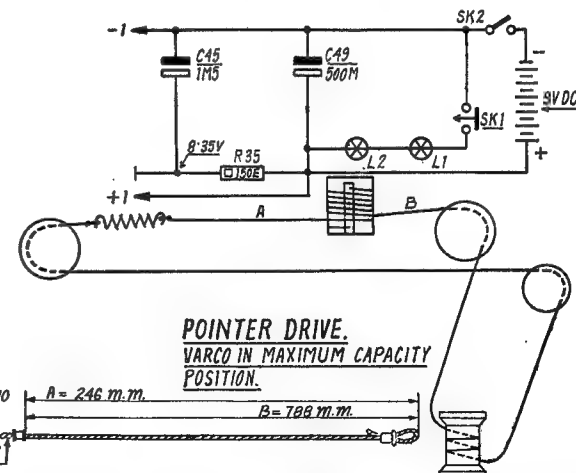
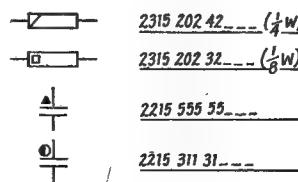
BAND SWITCH AS SEEN FROM PRINT SIDE
IN NON OPERATING POSITION



TRIMMING DATA

WAVE RANGE	SR. NO.	POSITION OF. VARCO.	TRIMMING FREQUENCY	ADJUST FOR MAX. OUTPUT.
MW	1	MAXIMUM.	517 Kc/s	S12/S13/14.
	2	MINIMUM.	1840 Kc/s	C 31
SW3	3	MAXIMUM.	2.35 Mc/s	S15/S16/17
	4	MINIMUM.	7.5 Mc/s	C23
SW1	5	MAXIMUM.	14.95 Mc/s	S18/S19/20
MW	6	TUNE	350 Kc/s	S2/S3/4
	7	TUNE	1900 Kc/s	C4
SW3	8	TUNE	4 Mc/s	S5
	9	TUNE	7.2 Mc/s	C5
	10	REPEAT 6 TO 9.	SCREW OUT CORE OF S8/S9/10	
SW2	11	TUNE	17.5 Mc/s	C13
	12	TUNE	9.6 Mc/s	S8/S9/10
	13	REPEAT 11 & 12	TURN C13 TO MIN. CAPACITY.	
SW1	14	TUNE	15.2 Mc/s	C8
	15	TUNE	21.5 Mc/s	C15

SYMBOLS.



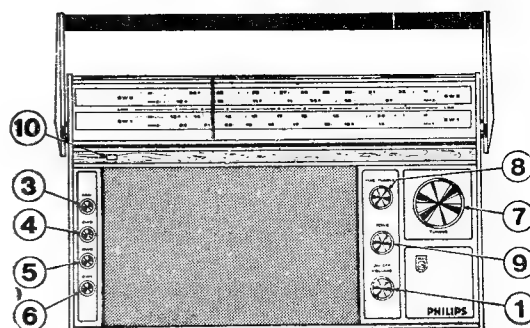
POINTER DRIVE.
VARCO IN MAXIMUM CAPACITY
POSITION.

15RC 509/01S
CIRCUIT DIAGRAM.



PHILIPS Service manual

RADIO 15RL517/00B



Year of release 1971

For 7.5 Volts Battery Supply

Waveranges

MW : 571 - 187 m (525 - 1605 KHz)
SW3 : 93.7 - 41.1 m (3.2 - 7.3 MHz)
SW2 : 31.5 - 25 m (9.5 - 12 MHz)
SW1 : 20 - 13.7 m (15 - 21.8 MHz)

Controls

1. On/Off switch and volume control
2. Radio/gramophone and taperecorder switch (on rear side).
Push button : 3. MW
4. SW3
5. SW2
6. SW1
7. Tuning
8. Fine tuning
9. Tone control with bass switch
10. Dial light self release switch

Sockets (at rear)

1. Aerial/Earth
2. Battery eliminator
3. Pickup/tape recorder

Transistors, diodes and Lamps

TR1 : BF194B
TR2 : BF195C
TR3 : BF195D
TR4/TR6 : BC158
TR5 : BC148B
TR7/TR8 : AC187/01 & AC188/01 (Matched pair)
X1/X2 : OA79
X3/X4/X5 : CD2A
L1/L2 : 3115 109 10010 (6 volts—60 mA)

Loudspeaker

2415 255 80106 (Z=5 ohms)

Batteries

Eveready type 1050 or equivalent (5×1.5volts cell)
Socket for connecting 7.5/9 volts battery eliminator is provided.

Built-in-Aerial

Ferroceptor for MW. Internal loop and external frame aerial for SW reception.

Consumption

Approximately 22 to 26 mA in minimum position of volume control.

Adjustment of collector current of output transistors

Include an ammeter (DC—10 mA) in collector circuit of TR8. Adjust the collector current to $5 \pm 0.3 \text{ mA}$ by means of potentiometer R31.

TRIMMING THE RECEIVER :—

Replace the speaker by 5 ohms matching resistor. Connect an output meter across the matching resistor. Set the pointer to Δ on extreme right hand side of dial in maximum capacity position of varco. Trim IF and RF circuits with lowest possible input signal as follows :

IF Circuits

Switch on the set to MW with varco in maximum capacity position. Apply modulated 452 KHz signal via 33 KpF condenser and trim for maximum output as follows :

1. Top of S22 and trim S24/25/26
2. Top of S19 and trim S22/23
3. Top of S17 and trim S19/20/21
4. Top of S1 and trim S17/18

RF Circuits

Set fine tuning to middle position & lift up the frame aerial. Radiate RF signal and trim for maximum output at frequencies shown in trimming data on circuit diagram.

A. Instructions for dismantling

1. Remove two screws at the top, two screws at the bottom and battery door fixing screw.
2. Remove back cover assy (cabinet).
3. Remove four screws (two on the left side and two on the right side of centre portion of cabinet).
4. Remove all the knobs.
5. Remove the front assy (cabinet) from centre portion (cabinet).

B. For replacing dial

1. Remove the perspex cover just by lifting from front after removing back cover.
2. To remove dial, now unscrew the four screws.

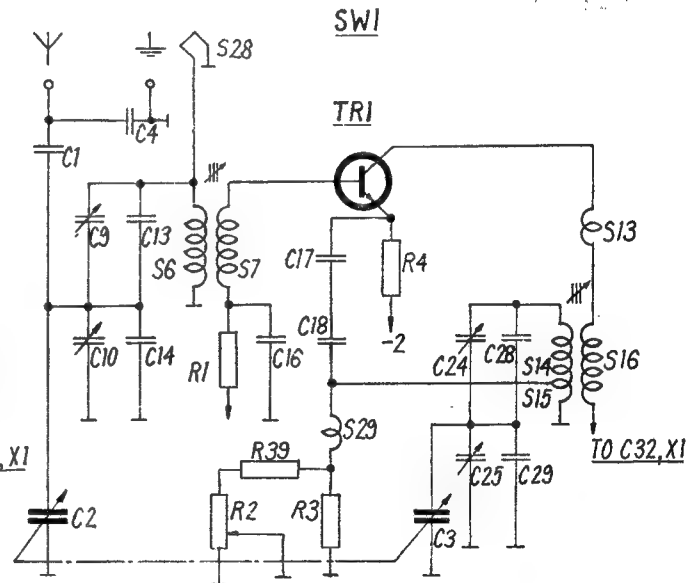
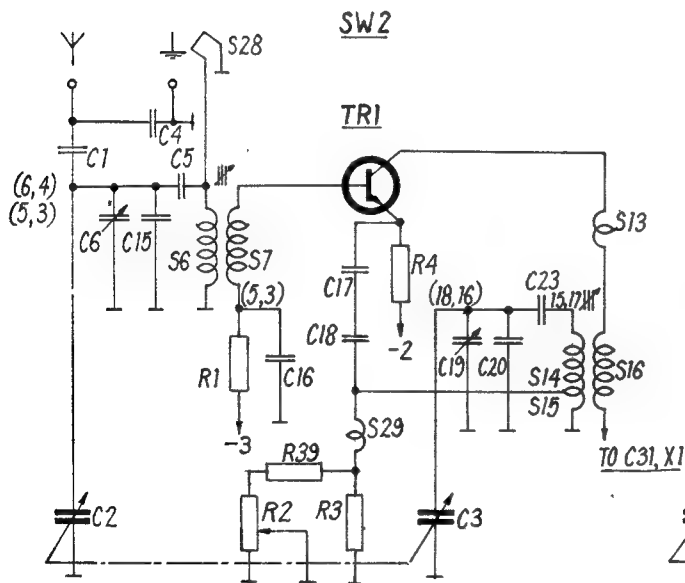
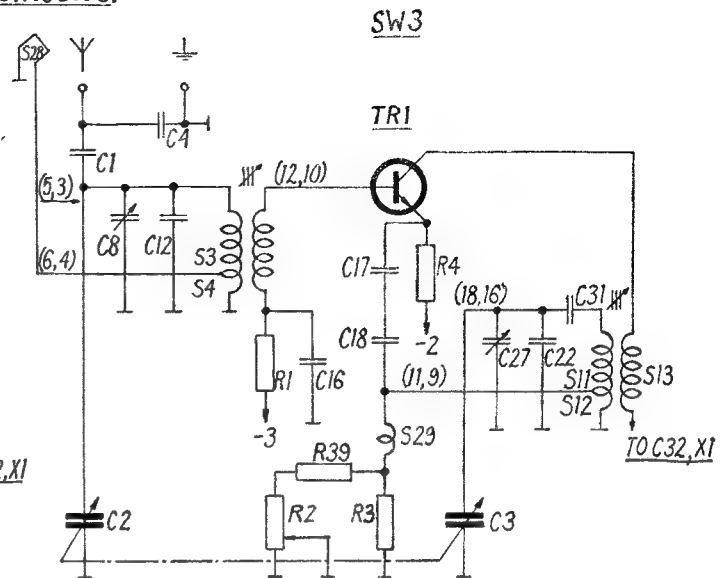
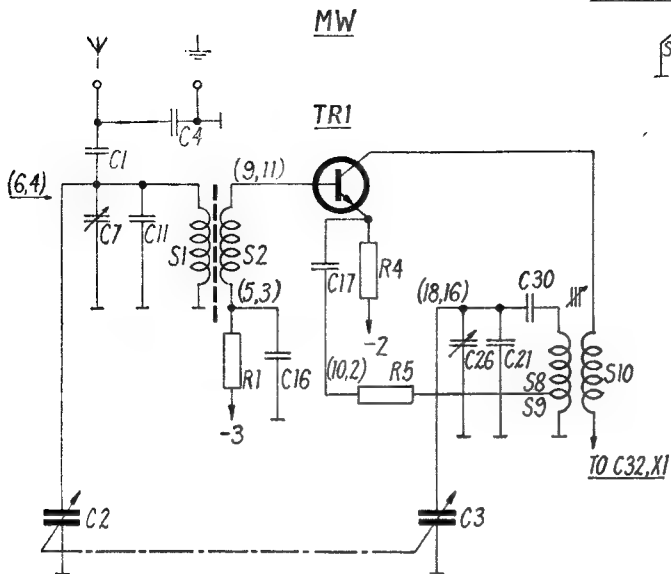
MECHANICAL PARTS LIST

Description	Code No.	Description	Code No.
Cabinet assy (front) ...	3115 109 00601	Battery eliminator socket ...	3115 200 20021
Cabinet frame (centre) ...	3115 104 03411	Radio/PU switch ...	3115 108 40551
Back cover (cabinet) ...	3115 108 02361	P.U./Tape recorder socket ...	2422 026 00884
Battery door ...	3115 104 02631	Earth socket ...	3115 101 60671
Handle ...	3115 109 00621	Aerial socket ...	3115 200 20111
Dial ...	3115 105 00601	Battery contact tag	
Pointer ...	3115 109 00591	(+ ve) × 3 ...	3115 100 20101
Dial cover ...	3115 108 70801	Battery contact coil	
Ornamental strip × 2 ...	3115 105 10531	spring (— ve) ...	3115 101 00171
Ornamental strip × 1 ...	3115 105 10541	Battery contact spring	
Ornamental plate (large) ...	3115 105 10571	(— ve) × 2 ...	3115 101 00181
Ornamental plate (band switch) ...	3115 105 10581	Dial lamp switch contact	
Ornamental grille ...	3115 105 10561	Plate ...	3115 101 60901
Frame aerial ...	3115 108 02351	Grommet for band switch	
Bracket assy for above × 2 ...	3115 109 00871	knob × 4 ...	3115 104 02651
Knob (tuning) ...	3115 109 00631	Nut in frame assy to fix	
Knob (volume, tone & fine tuning) × 3 ...	3115 109 00611	battery door screw ...	2522 406 02005
Knob for band switch × 4 ...	3115 104 02641	Pin for fixing handle × 2 ...	3115 101 60821
Slide for dial light ...	3115 104 02751	Nut for fixing handle × 2 ...	2522 401 04011
S6 slide switch × 3 ...	3115 108 40211	Bush for drive cord in drum... ..	3115 101 00971
Slide for above × 3 ...	3115 103 30321	Bush for drive cord × 2 ...	3115 101 60981
Catch pin for above and lever × 6 ...	3104 104 01161	Plug for PU/TR socket ...	3115 101 60981
Drive unit for slide switch ...	3115 108 02331	Battery eliminator cord assy... ..	9.78/5 × 180
Connecting lever for above × 3 ...	3115 104 02721	9.68/BEC/30	
Drum for varco ...	3115 104 02881	Screws for fixing :-	
Gear wheel for varco ...	3115 104 02681	Battery door ...	3115 105 10591
Grommet for fixing varco bracket × 3 ...	3122 114 00031	Cabinet back cover (top) × 2 ...	2515 123 89003
Plug for fixing varco bracket × 3 ...	3115 104 03421	Cabinet back cover (bottom) × 2 ...	2522 017 09428
Tuning spindle ...	3115 101 60891	Cabinet frame to front assy × 4 ...	2515 123 89003
Bush for above ...	3122 102 00451	Dial (top) × 2 ...	2522 001 07076
Drive pulley × 2 ...	3122 108 02801	Dial (bottom) × 2 ...	2515 123 89001
Drive pulley (on metal bracket) ...	3122 794 04991	Spring for fixing :	
Lamp holder × 2 ...	3115 100 10051	Drive cord ...	3122 101 06981
Nut for fixing potmeters × 3 ...	3115 101 21991	Dial lamp contact ...	3115 101 60791
Holder for ferroceptor ...	3115 104 02661	Band switch × 4 ...	3115 101 00511
Socket plate assy ...	3115 109 01541	Band switch × 1 ...	3122 993 61471
		Tuning knob ...	3115 101 00351
		V/C, F/T and tone knob × 3 ...	3122 100 40771
		Frame Aerial Bracket ...	3115 101 00401

ELECTRICAL PARTS LIST

Part No.	Code No.	Part No.	Code No.
C5 (390 pF) ...	2015 361 33901	C50 (100 MF) ...	2215 001 43101
C6, C7, C8, C9, C10 (22 pF), C19, C24, C25, C26, C27... ..	2215 808 00006	C52 (3900 pF) ...	2215 563 02392
C17, C38, C49 (8200 pF) ...	2215 563 02822	C53, C54 (400 MF) ...	2215 001 42401
C18 (4700 pF) ...	2215 563 02472	C56 (1000 MF) ...	2015 083 00102
C23 (300 pF) ...	2015 361 33001	C57 (1000 MF) ...	2015 083 00102
C30 (435 pF) ...	2015 361 34351	C60 (4 MF) ...	2215 001 90011
C31 (2700 pF) ...	2015 361 42702	R2 (1000 ohms) ...	2315 380 74524
C32 (3600 pF) ...	2015 361 33602	R14 (17K + 5K ohms) ...	2315 381 74582
C34 (64 MF) ...	2215 001 12649	R24 (100K ohms) ...	2315 381 74531
C45 (100 KpF) ...	2015 629 01104	or (22K ohms) ...	2315 381 74528
C46 (330 pF) ...	2215 563 02331	R31 (220 ohms) ...	2315 411 02202
C47 (15 KpF) ...	2015 629 03153	R32 (120 ohms) ...	2115 611 00003
		L1, L2 (6v-60 mA) ...	3115 109 10010

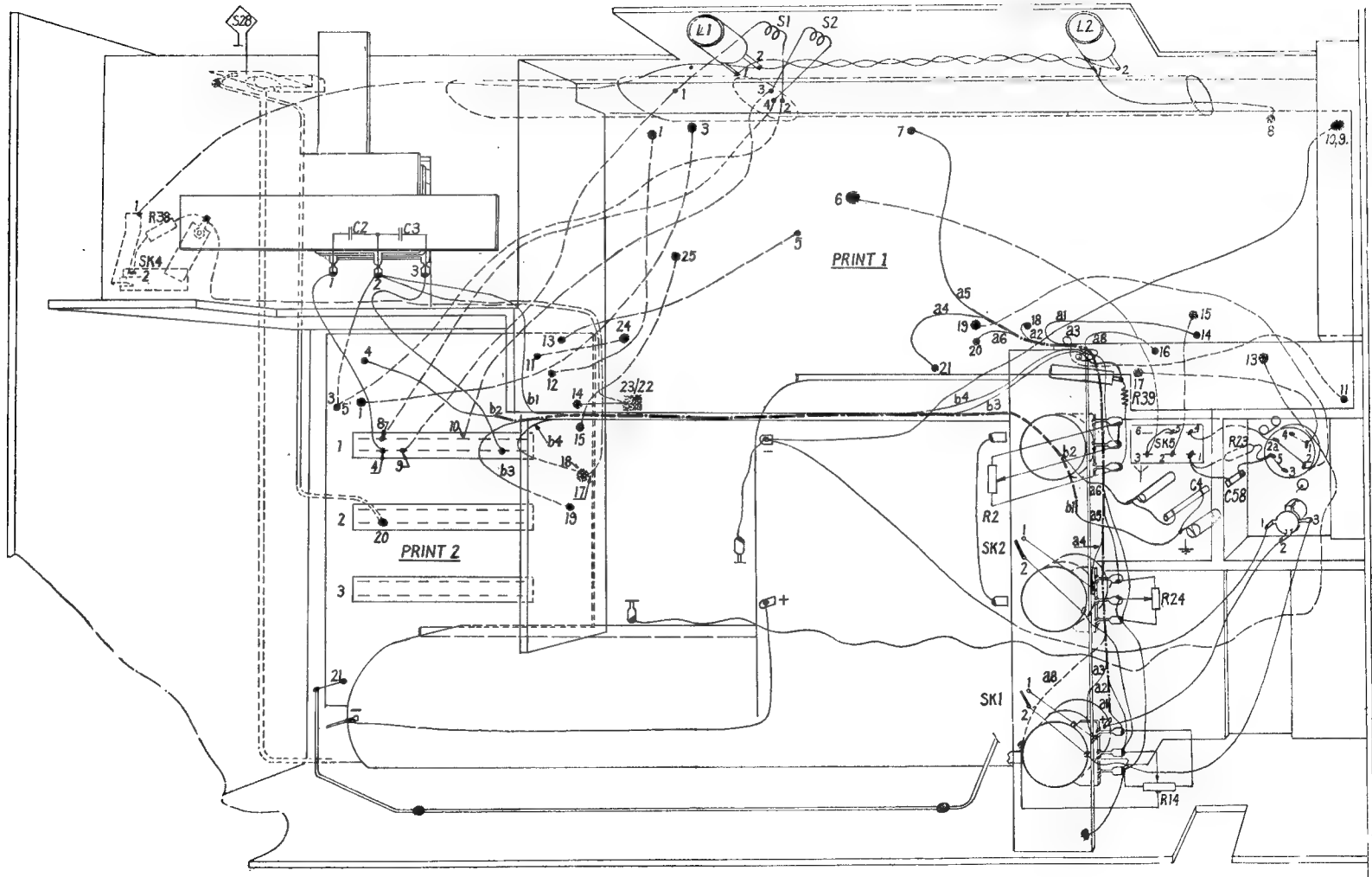
RF CIRCUITS.



NOTE: NUMBERS IN BRACKETS INDICATE SHORTING CONTACTS OF BANDSWITCH.

15RL 517/00B.

R:	38					2		30, 24, 14, 23
C:		2	3					58, 4
S:	28				1	2		



15RL 517/00B

Circuit Description

The main stages in the set include frequency converter, two IF amplifiers, detector diode and a 4-step AF stage. Band selection is achieved by changeover contacts of the push button switches. The push button for SW1 does not have any switch contacts; it only releases the other switch buttons; thus the standby position of all the switches completes the circuit for SW1.

1. Frequency Converter

(a) Aerial Section

The simplified diagrams for the different bands are given in figure for RF circuits. The DC conditions for TR1 (BF194B) are satisfied by base resistor R1 stabilised by C16, emitter resistor R4 (returned to a lower potential) and collector resistor R6 stabilised by C33. Since the stage is fitted with ferroceptor aerial for medium wave and frame aerial for short waves, the minimum signal from the outdoor aerial is brought in through a small value capacitor C1 and shunted by a moderate value capacitor C4.

The aerial circuit is tuned for medium wave by S1-C11/C1/C2. Here S1 and C7 are adjustable for tracking purposes. The aerial circuit for SW3 is tuned by S3/4-C12-C8/C2. Here again core of S3/4 and C8 are adjustable for tracking. Similarly for SW2, the aerial tuned circuit is composed of S6-(C5)/C15/C6/C2 with S6 core and C6 providing alignment. For SW1, the aerial coil remains the same and the aerial circuit is tuned by S6-C13/C9/C14/C10/C2. Here the trimmers C9 and C10 are used for alignment.

(b) Oscillator Section

Simplified circuits for each band are given in figure for RF circuits. The oscillator is of the straight forward feedback type, using the tank between emitter and base. The tap on the tank circuit coil (and also R5 on medium wave) takes care of proper matching. For SW bands, fine tuning has been provided by the action of a variable resistor R2 in series with S29 which changes the net reactance across part of the oscillator coils. Other resistors R3 and R39 determine the amount of frequency variation.

2. IF Amplifier

The IF signal generated by TR1 is accepted through the untuned IF amplifier S17/S18 by proper load matching, RF signals being strongly attenuated by C32. The DC conditions for TR2 are set by base resistor R7 stabilised by C34, emitter resistor R8 decoupled by C35 and collector resistor R9 stabilised by C36. The amplified signal is fed to the tuned IF transformer S19/S20-S21 which is again directly coupled to another tuned IF circuit of S22-S23 of high 'Q'. TR2 accepts AGC bias at its base from the detector stage via filter C43-R10-R7/C34.

For protection against overload by strong signals, a safety diode X1 (OA79) is utilised. During weak and moderate signals the DC voltages at the collectors of TR1 and TR2 are such that the diode is cut off. When strong signals come in, the collector current of TR1 increases, lowering this collector potential whereby X1 conducts and signals are damped by C36 before they find their way to the next stages. TR3 feeds the amplified IF signal to the last tuned transformer S24/25-S26.

3. Detector

The detector diode X2 is kept conducting because its anode is returned to—5.6 volts via S26, R10 and R7 and its cathode is connected (via R19) to potential divider between—5.6 and—6.8 volts by R20-R21. The voltages are so adjusted that the AGC action works satisfactorily up to a very high signal (about 250 mv/m).

4. AF Stage

The demodulated voltage (after filtering by C44, R19 and C49) is fed to the volume control R14 through coupling condenser C45 via radio/pickup switch. The physiological tone corrector is composed of R13-C39 at low volume settings. A slight high tone compensation is applied by C38-R12 for higher volume settings.

The DC conditions of TR4 are adjusted by base resistor R16-R18 emitter resistor R17 and collector resistor R18. Resistor R16 between base and collector gives both DC and AC negative feedback. The bass

switch SK2 increases the value of coupling capacitor C42 by C41, to omit bass attenuation. The treble control R24 varies the by passing action of C47 for high notes. Capacitor C46 acts as a residual IF filter.

The other audio stages are DC coupled with adequate negative feedback. C59 in TR5 provides local high tone negative feedback. R27 and C50 is effective only at high treble notes. Frequency dependent negative feedback is provided by the output signal by coupling loudspeaker voltage back to the emitter of TR5.

The output stage contains a complimentary-symmetry circuit with AC187 and AC188. The bias voltages which are equally set at near about the cut-off potential are stabilised by the NTC resistor R32 where the fine adjustment for 5 mA collector current is done by R31. Stabilising diode

X3 (CD2A) determines the overall voltage stability to the bias network through resistors R33 and R34.

Audio voltage at the emitters of the output transistors is fed to the loudspeaker via C53/C54 where C60 acts as the main tone corrector.

5. Power Supply

The power section of this set supplies various filtered voltages for different stages. While the full voltage is fed to the audio output stage, other stage get reduced supplies. Two diodes X4 and X5 in series with R36 maintain a nearly constant voltage difference between points -2 and -3. Thereby the base-emitter supply voltage for osc. and IF sections is kept highly stabilised. With run down battery the set will still work with full sensivity and selectivity, only the sound output will be less.

15RL517/00B

During production of this model a few changes in the mechanical parts have been introduced. The changes and the code numbers of the parts required are given below :

1. Handle assy with its fixing parts.
2. Pointer Drive system with two Gear Wheels.
3. Drive Cord Length.

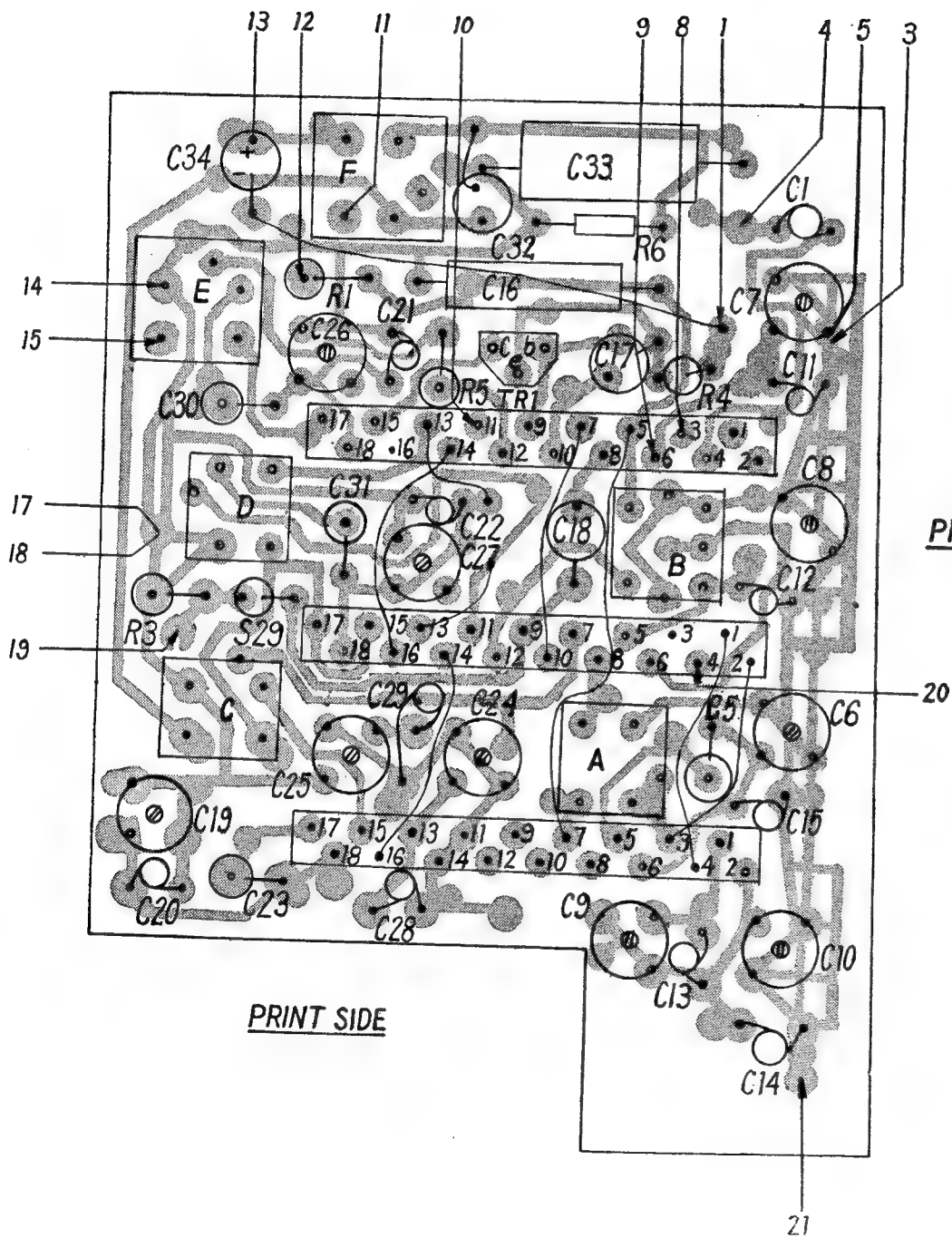
Description	Deleted	Added
Handle Assy ...	3115 109 00621	3115 109 00701
Cabinet Frame ...	3115 104 03411	3115 104 03251 or 3115 109 01291
Spring × 2 ...	...	3115 101 00331
Ring × 6 ...	...	3122 104 27121
Gear wheel ...	3115 104 02681	3115 204 00481 (near varco)
Gear wheel ...	...	3115 204 00491
Drum ...	3115 104 02881	3115 104 03531
Spring for Drive Cord	3122 996 46821	3122 101 06981
Spring for Gear wheel	...	3111 111 00761
Washer ...	...	3111 010 41671
Retaining Ring ...	...	2522 634 04004
Cord Length ...	338 + 772 mm	309 + 697 mm

Note 1 : Code No. for S3/S4/S5 should read as 3115 107 30011 in place of 3115 207 30011.

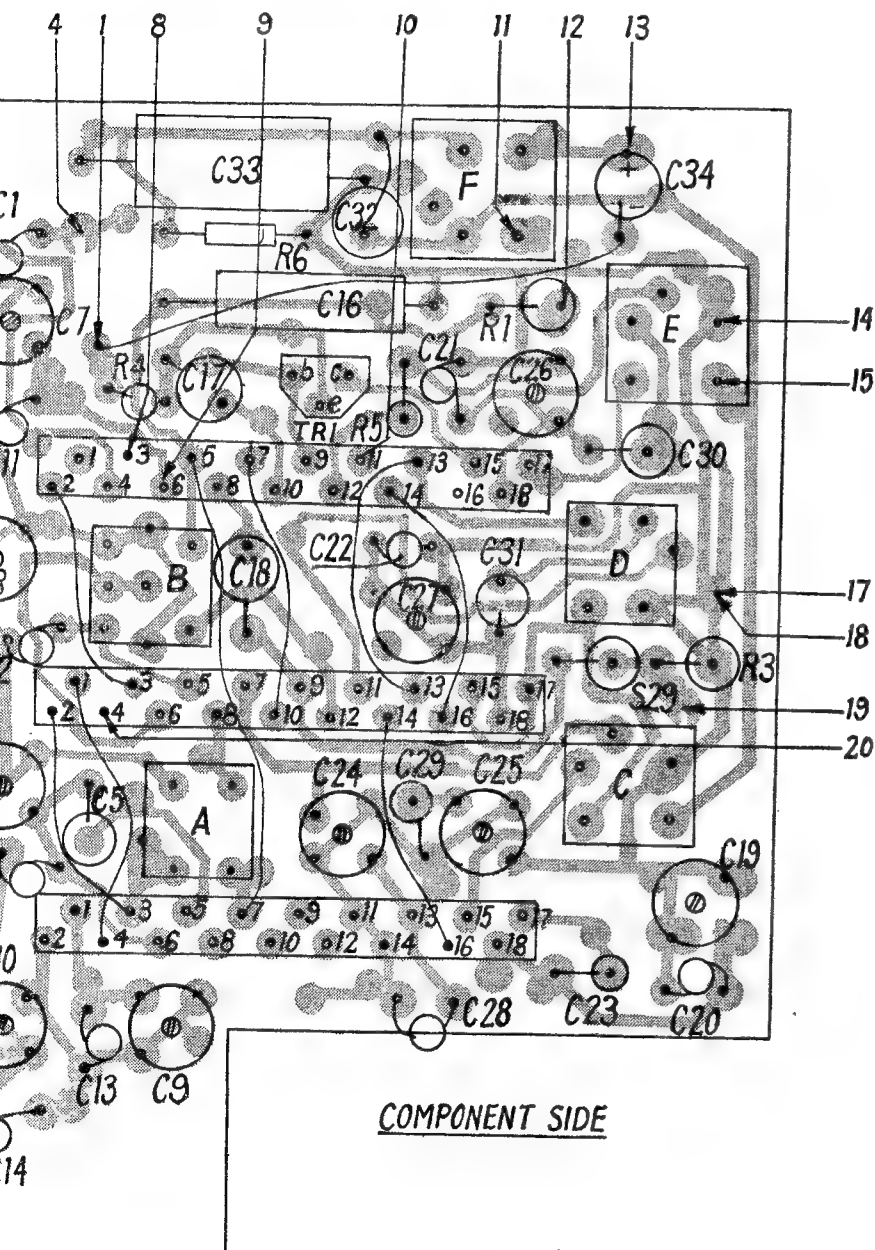
2 : Refer drawing print side of print 2—

- a) Delete connections between Pin 13 to C22 of slide switch — MW.
- b) Delete connections between pins 11 and 13 of slide switch — SW3.
- c) Add connections between pins 13 of slide switches — MW & SW3.

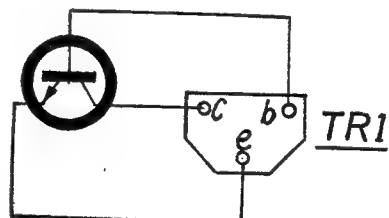
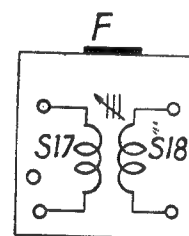
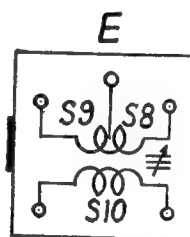
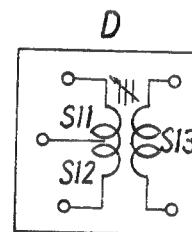
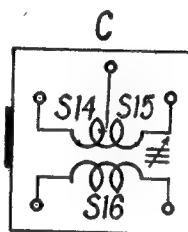
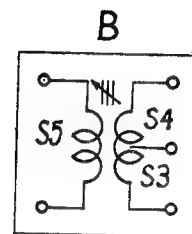
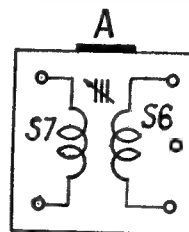
R:	3,	1	5	6	4	R:
C:	20, 19,	23, 26, 31, 21,	22, 24,	33, 17,	13, 7, 1, 11, 6,	C:
C:	34, 30,	25,	29, 28, 27, 32, 16,	18, 9,	5, 12, 14, 8, 15, 10,	C:
S:	E, D, C, 29,	TR1	A	B		S:



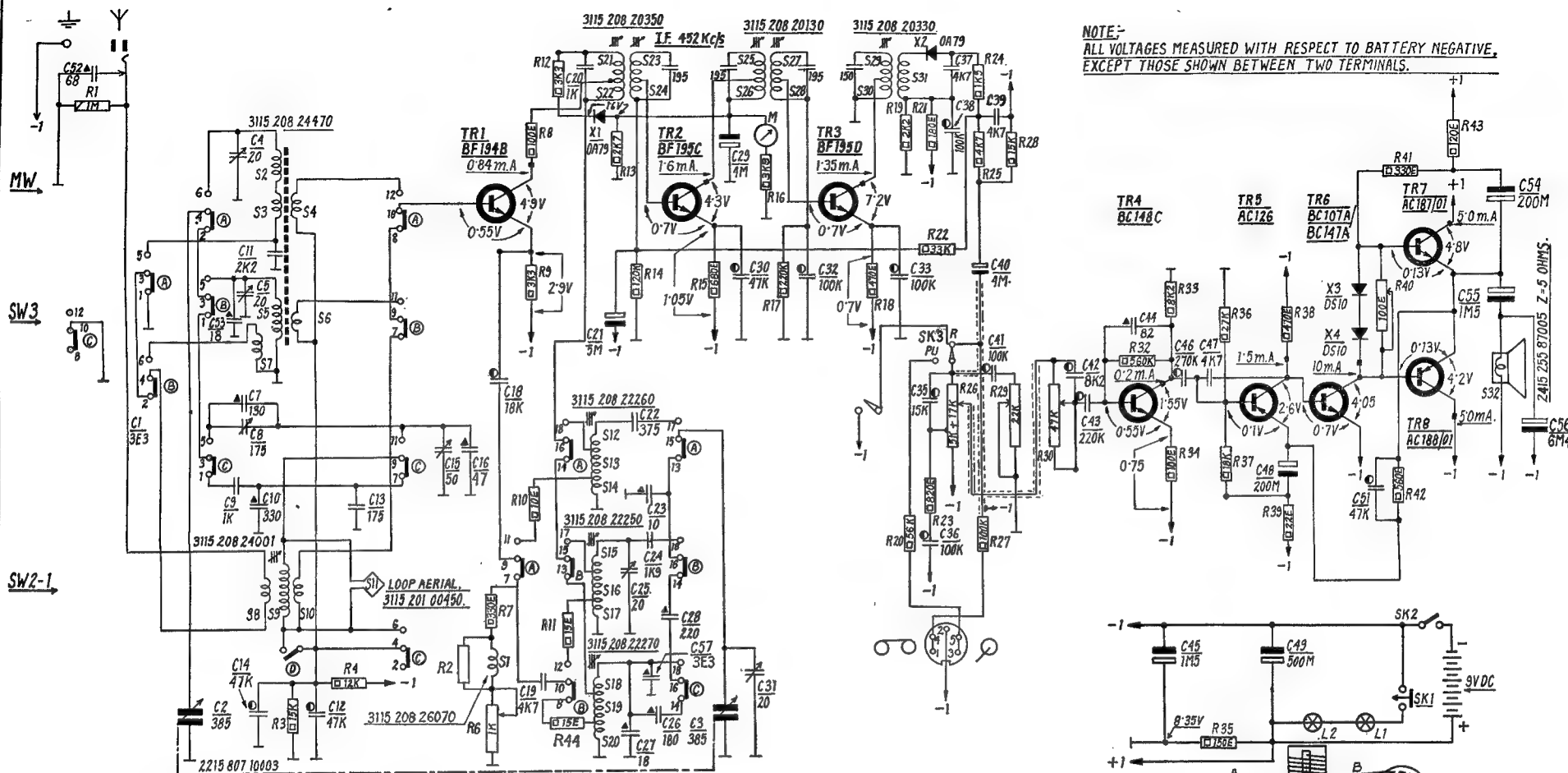
4,	6,	5,	1,	3
1,8,10,7,5,9,17,33,	16,32,21,	26,31,	34,30,19,	
12,15,14,13,	18,	22,24,29,28,27,25,	23,	20.
B, A,	TR1,	F	D,29,E,C.	



COILS DRAWN AS SEEN
FROM PRINT SIDE

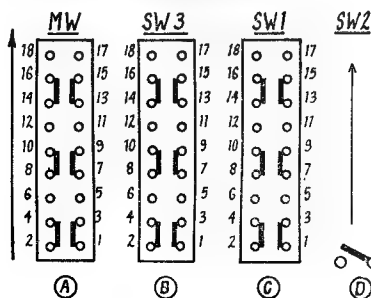


15RL 517/00B



NOTE:-
ALL VOLTAGES MEASURED WITH RESPECT TO BATTERY NEGATIVE,
EXCEPT THOSE SHOWN BETWEEN TWO TERMINALS.

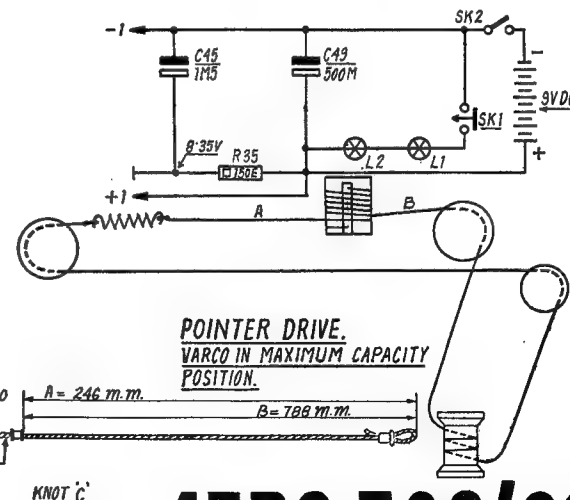
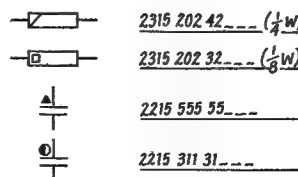
BAND SWITCH AS SEEN FROM PRINT SIDE
IN NON OPERATING POSITION



TRIMMING DATA

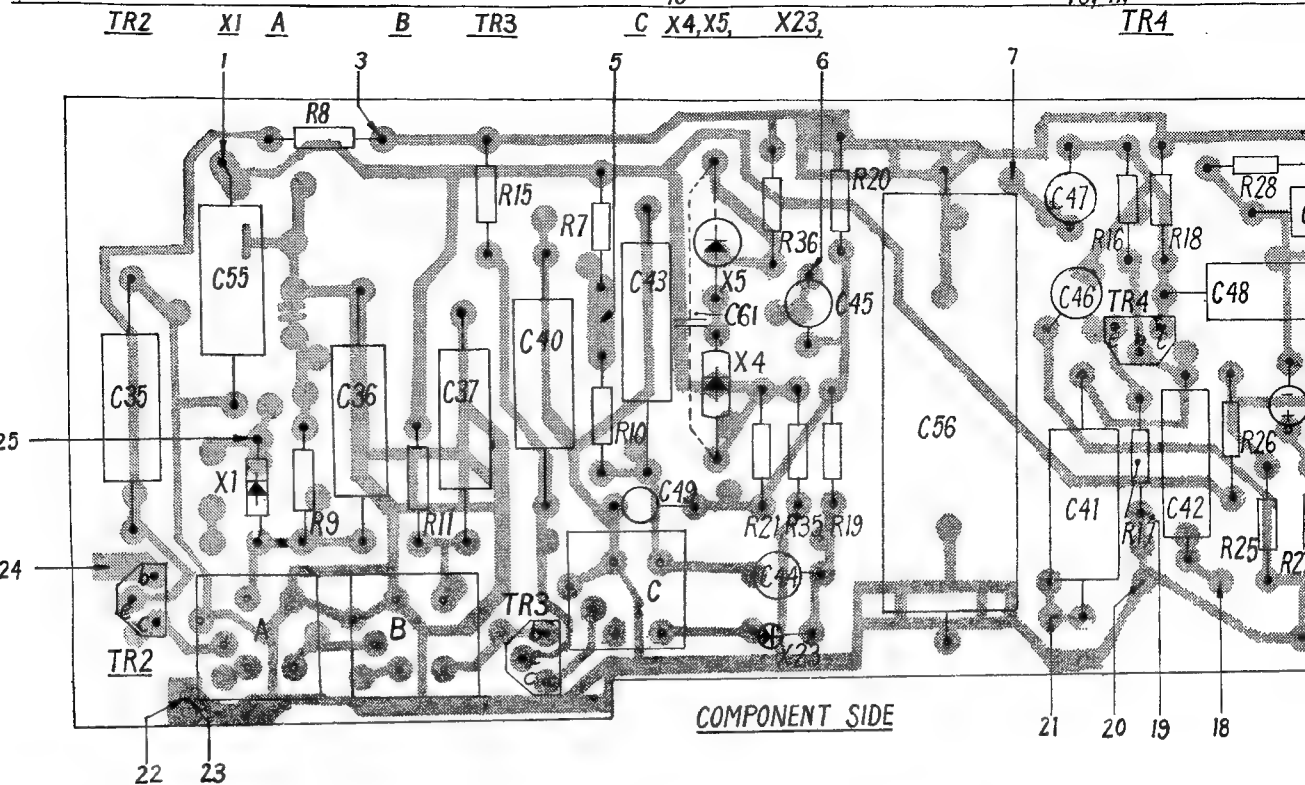
WAVE RANGE	SR. NO.	POSITION OF. VARCO.	TRIMMING FREQUENCY	ADJUST FOR MAX. OUTPUT.
MW	1	MAXIMUM.	517 Kc/s	S12/S14.
	2	MINIMUM.	1640 Kc/s	C 31
SW3	3	MAXIMUM.	2.35 Mc/s	S15/S17
	4	MINIMUM.	7.5 Mc/s	C23
SW1	5	MAXIMUM.	14.95 Mc/s	S18/S20
	6	TUNE	550 Kc/s	S2/S4
MW	7	TUNE	1500 Kc/s	C4
	8	TUNE	1 Mc/s	C5
SW3	9	TUNE	7.2 Mc/s	C5
	10	REPEAT 6 TO 9. SCREW OUT CORE OF S8/S10		
SW2	11	TUNE	11.9 Mc/s	C13
	12	TUNE	9.6 Mc/s	S8/S10
SW1	13	REPEAT 11 & 12. TURN C15 TO MIN. CAPACITY.		
	14	TUNE	15.2 Mc/s	C8
SW1	15	TUNE	21.5 Mc/s	C19

SYMBOLS.



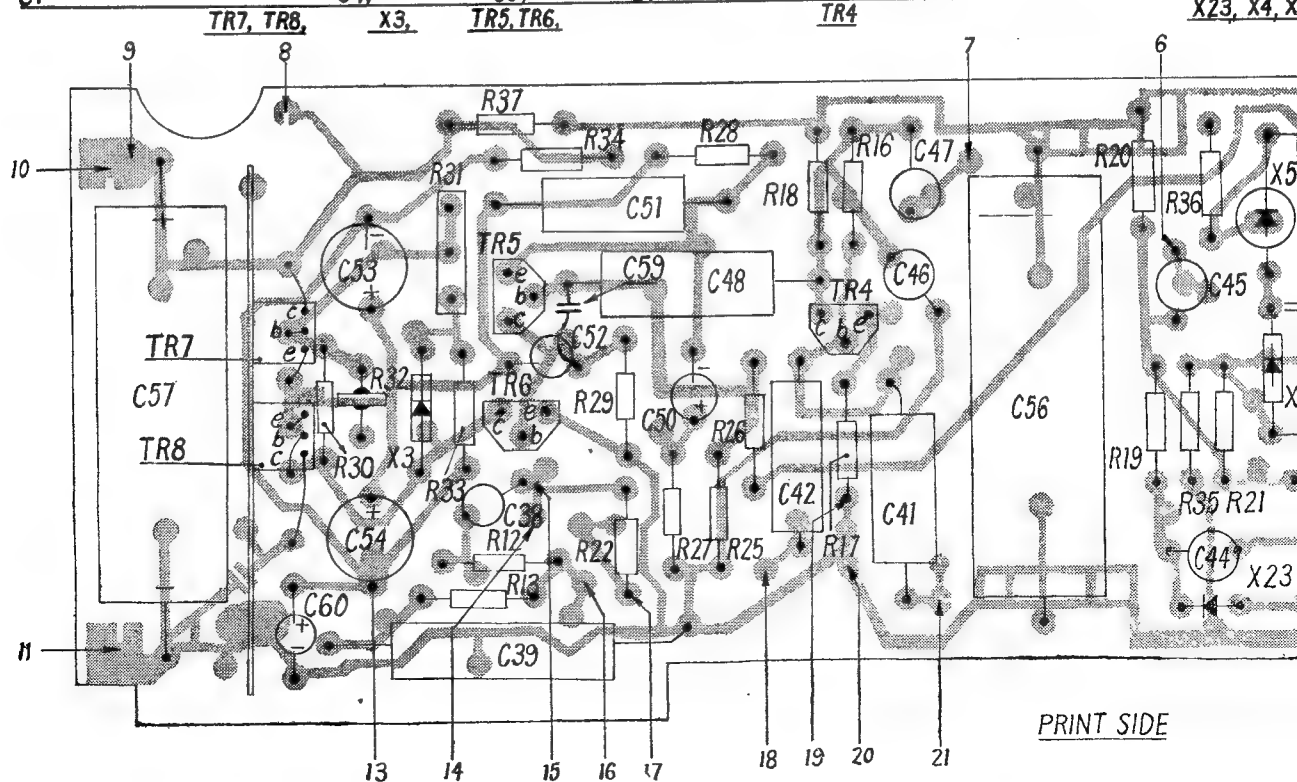
POINTER DRIVE.
VARCO IN MAXIMUM CAPACITY
POSITION.

15RC 509/01S
CIRCUIT DIAGRAM.

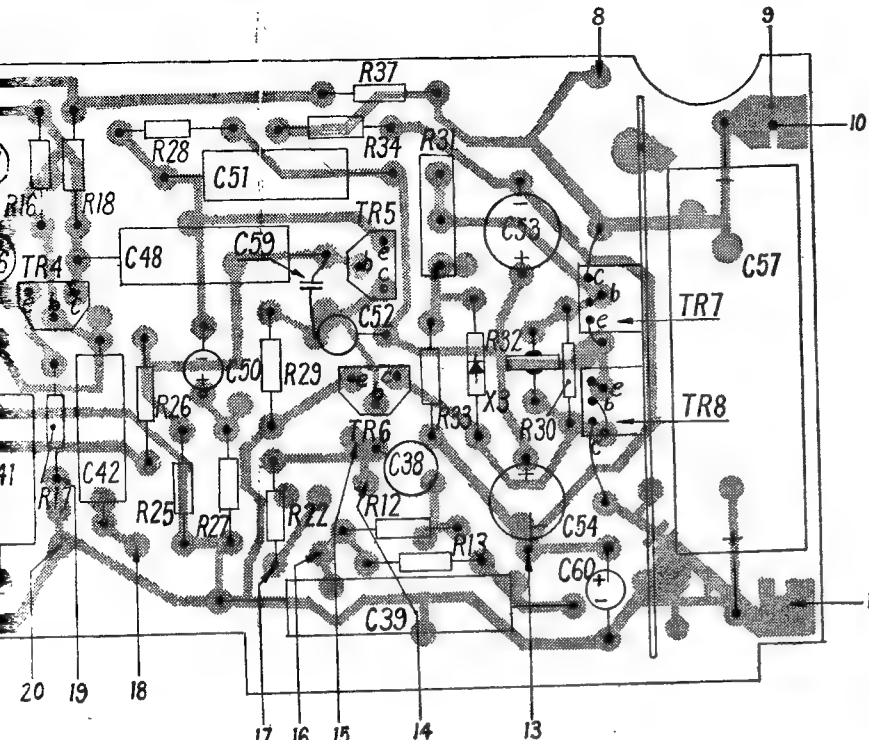


PRINT 1

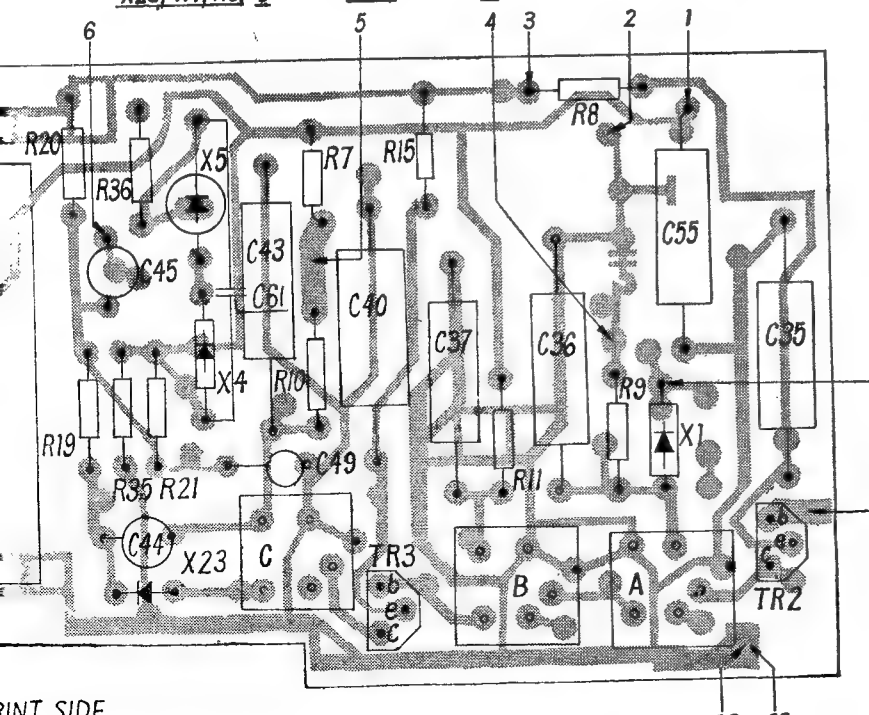
R:	30, 32, 31, 37, 34, 29, 27, 28, 25, 18, 17, 16	19, 36, 21
R:	33, 12, 13, 22, 26	20, 35
C:	57, 60, 53, 39, 52, 51, 59, 48, 42, 41, 47, 56	44
C:	54, 38, 50	45
	TR7, TR8, X3, TR5, TR6, TR4	X23, X4, X



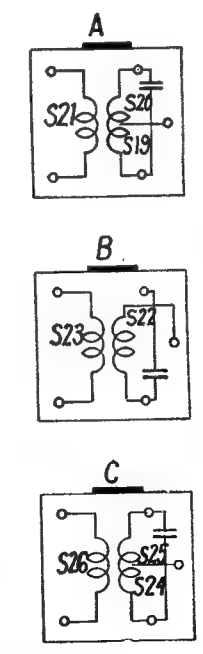
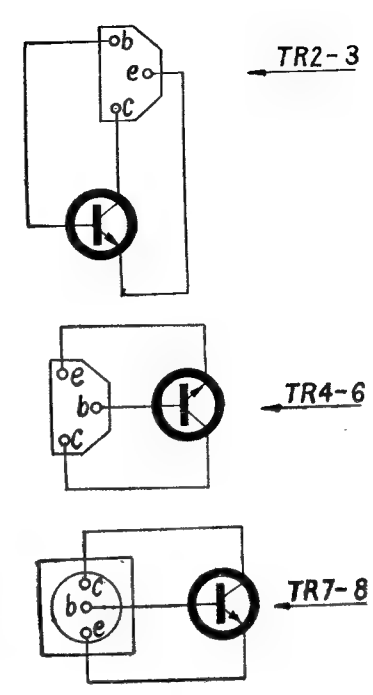
16, 18, 25, 28, 27, 29, 37, 12, 31, 32, 30.
 17, 26, 22, 34, 33, 13.
 42, 48, 51, 9, 52, 38, 53, 60, 57.
 41, 50, 39, 54.
TR4 TR5, TR6, X3, TR7, TR8.



19, 36, 21, 10, 7, 15, 11, 8, 9.
 20, 35, 44, 43, 49, 40, 37, 36, 55, 35.
 45
X23, X4, X5, C TR3, B A X1, TR2

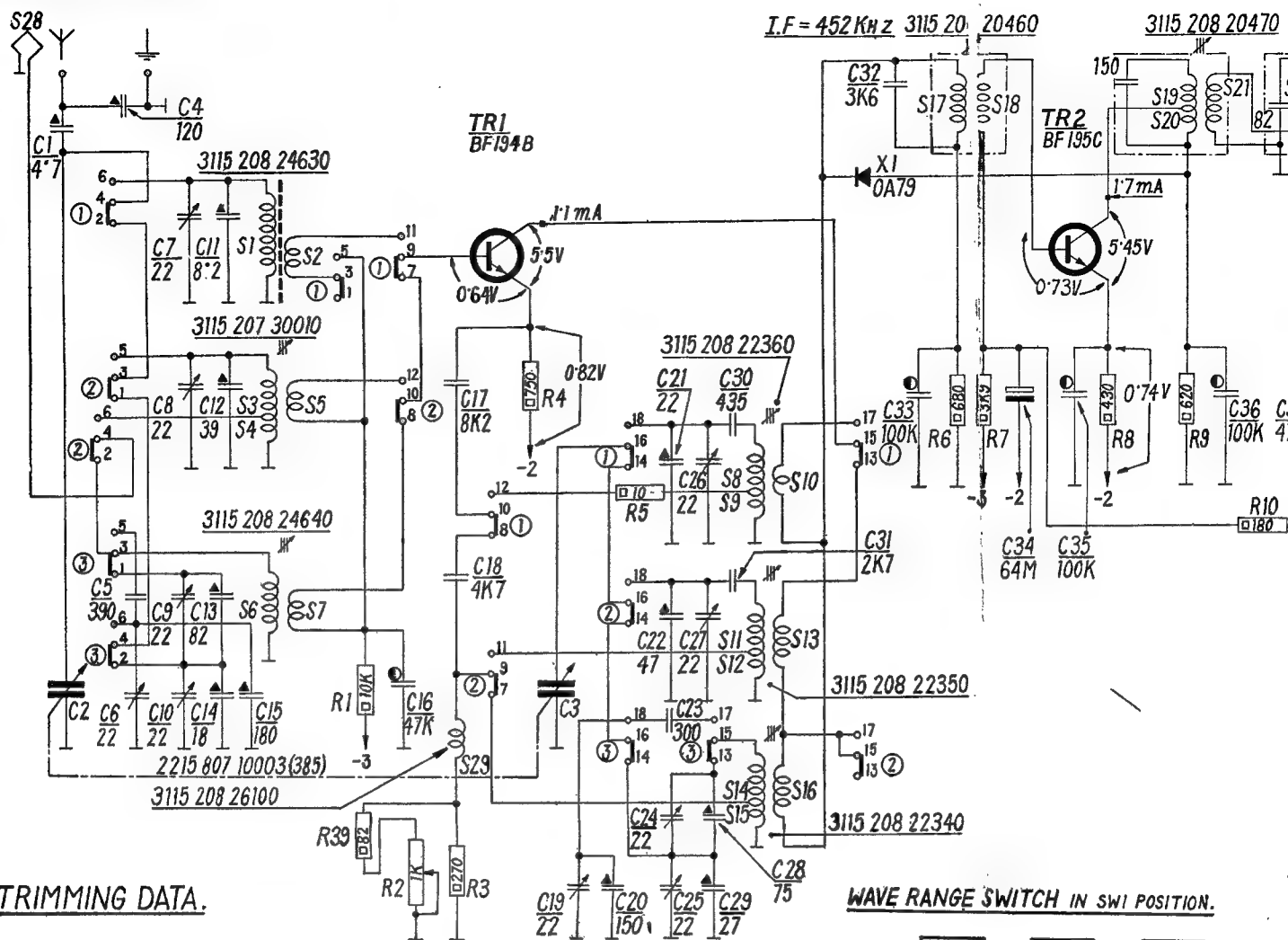


PRINT SIDE



COILS DRAWN AS SEEN FROM PRINT SIDE.

15RL 517/00B



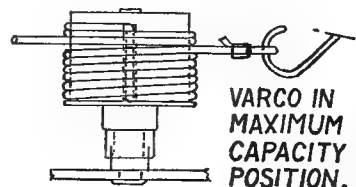
SYMBOLS.

2215 555 55 ---
2215 311 31 ---

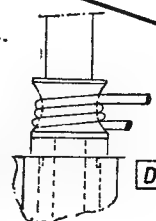
2315 202 32 --- $\frac{1}{8}$ W
2115 104 04 --- 1 W

(B)

(A)



VARCO IN MAXIMUM CAPACITY POSITION.



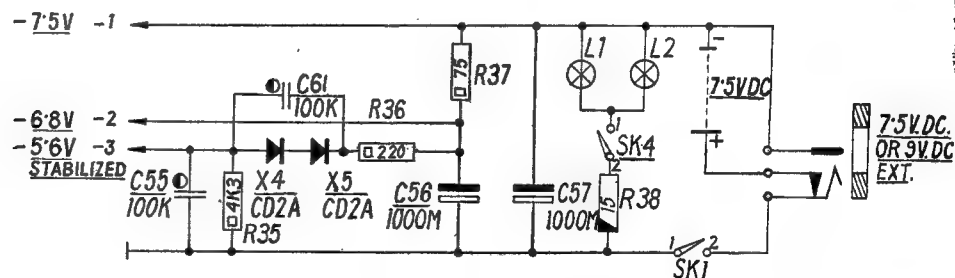
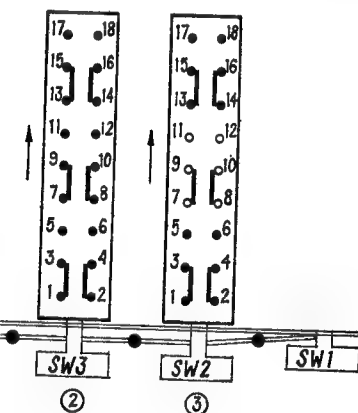
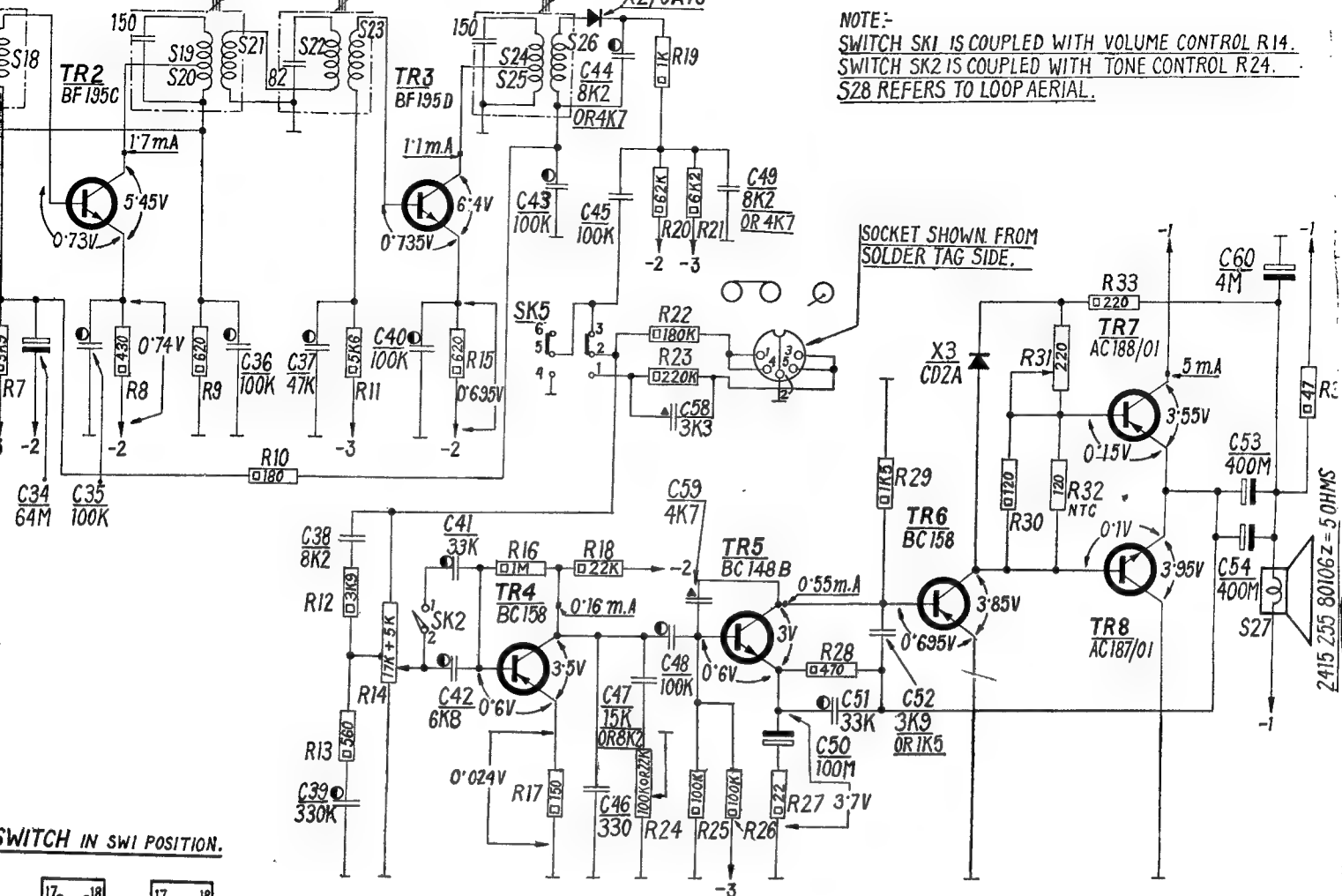
20460

3115 208 20470

3115 208 20480

3115 208 20490

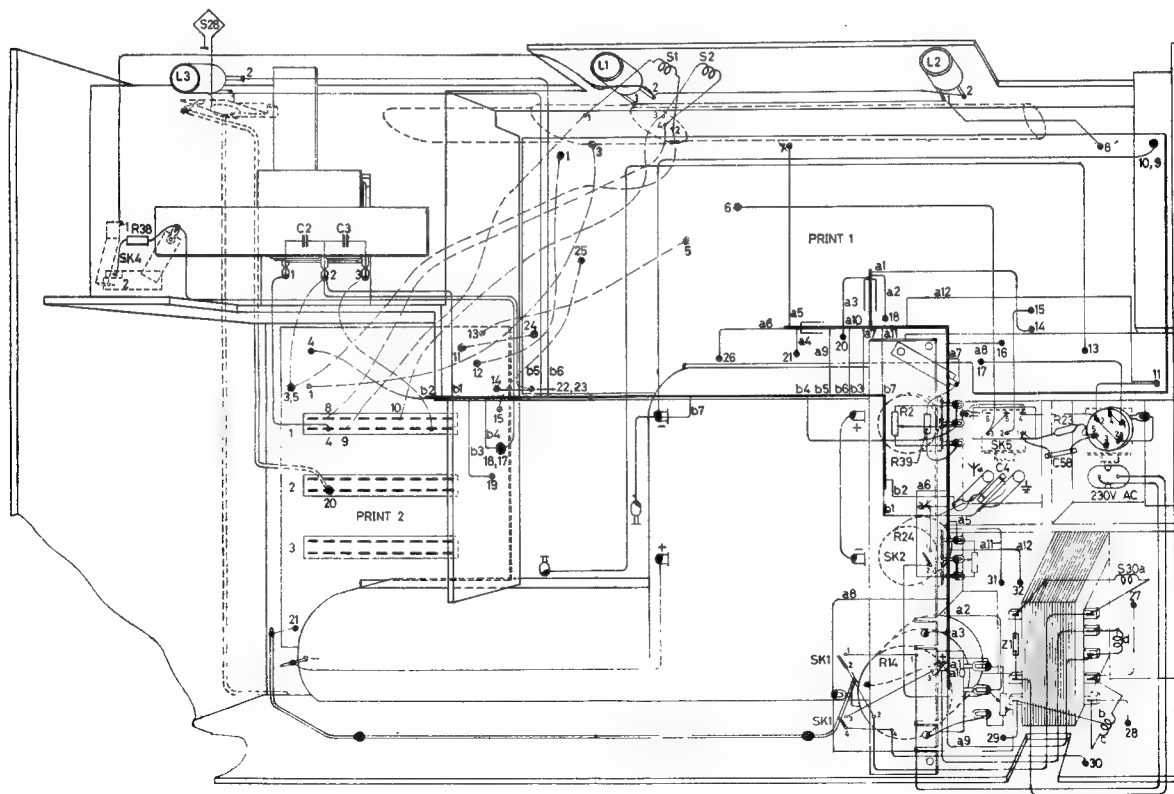
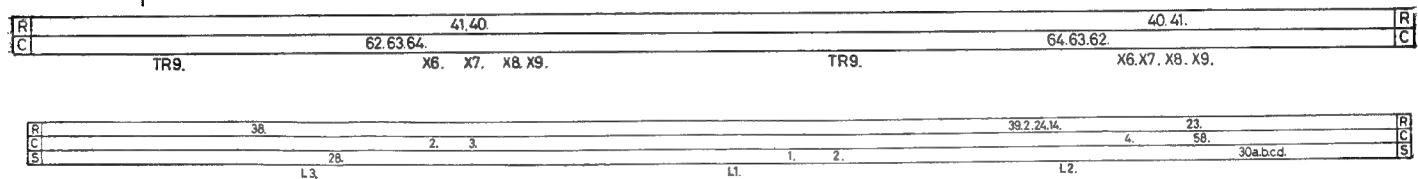
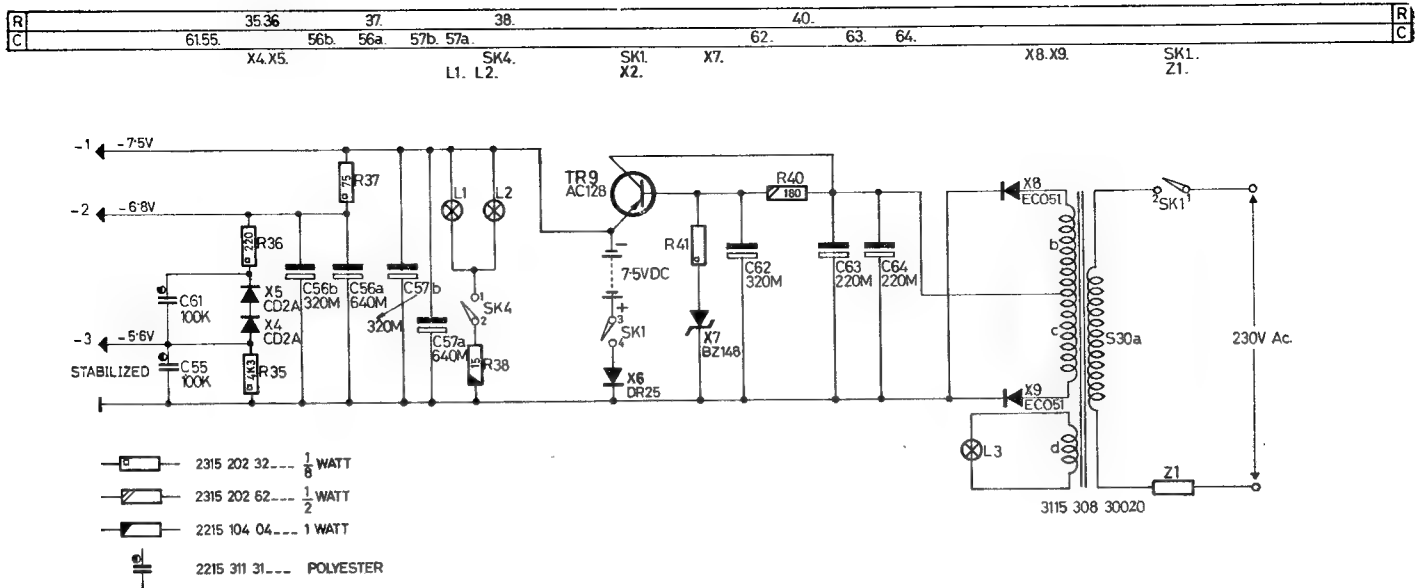
X2/0A79



POINTER DRIVE

772 mm. 338 mm.

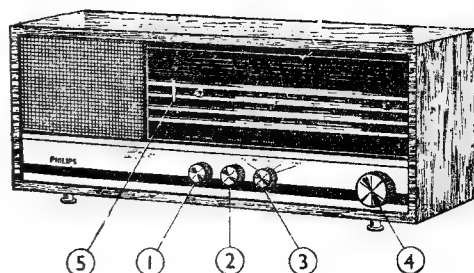
15RL 517/00B





PHILIPS Service manual

RADIO 15RB525/00Z/11Z



Year of release 1972-73

For AC Mains Supply

Waveranges

MW : 185 - 580 m (1622 - 517 Kc/s)
SW3 : 37 - 100 m (8.1 - 3.0 Mc/s)
SW2 : 24.8 - 33.3 m (12.1 - 9.0 Mc/s)
SW1 : 13.3 - 20.3 m (22.75 - 14.7 Mc/s)

Controls & Indicators

- (1) On/Off switch and Tone control
- (2) Volume control
- (3) Wavering switch : PU — MW — SW3 — SW2 — SW1
- (4) Tuning
- (5) Tuning indicator

Valves & Dial Lamps

B1 : ECH 81 B4 : EM 84
B2 : EBF 89 B5 : EZ 80
B3 : ECL 82 L1/L2 : 8009D-00

Loudspeaker

2415 255 87005 (5 ohms)

Consumption

45 Watts approximately

Built-in-aerial

Ferroceptor for MW and Plate Aerial for SW are provided.

TRIMMING THE RECEIVER :—

Refer circuit diagram for trimming data.

General

Adjust pointer to left mark 'A' with tuning condenser in maximum capacity position. Set the volume control to maximum and tone control to maximum treble. Connect an output meter to the external loudspeaker socket. Trim IF and RF circuits with lowest input signal as follows :

IF Circuits

Switch on the radio in MW position with tuning condenser in minimum capacity position. Screw out cores of S13, S14, S15 as far as possible. Apply modulated 452 Kc/s signal to the grid (gl) of Valve B1 (ECH81) through capacitor of 33,000 pF and successively trim S16, S15, S13, S14 and S15 for maximum output.

RF Circuits

Apply signal to aerial socket via dummy aerial and trim for maximum output at frequencies shown in trimming data as follows :

- (1) MW — at C & B (3) SW1 — at C & B (5) SW2 — at B
- (2) SW3 — at C (4) SW3 — at B

Dial lamp 2×8009D-00 are replaced by Dial lamps 2×8045D-00. While replacing add one resistor Code No. 2315 202 62228 in series between Dial lamp L1 (8045D-00) and S23.

Version 15RB525/00Z is similar to 15RB505/00Z and 15RB525/11Z is similar to 15RB525/00Z with the exception of a few changes in the parts list. The changes are indicated separately.

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Cabinet	3115 109 00431	Bracket for fixing back plate . . .	3115 101 21121
Back plate	3115 103 20741	Spring for fixing knobs . . .	3122 995 22081
Bottom plate	3115 103 20751	Gear wheel	3115 204 00481
Leg	3115 104 02051	Gear wheel	3115 204 00491
Ornamental ring	3115 205 10411	Spring for gear wheel	3111 111 00761
Grille	3115 104 01931	Retaining ring for varco drum . . .	2522 634 04005
Ornamental plate	3115 105 10391	Pulley (Tuning)	3122 794 39641
Dial	3115 108 70631	Plate spring (Band switch)	3115 101 00161
Pointer	3115 108 70651	Spring for coil (IF)	3115 201 00111
Knob (Tuning)	3115 108 70671	Spring for coil (large)	3115 201 00101
Knob (Tone & Vol)	3115 108 70661	Spring for coil (small)	3115 201 00081
Knob (Wavering)	3115 108 70681	Bush for drive cord×4	3115 204 00901
Mains cord assy	3115 108 50151	Socket plate assy	3115 208 06691
Switch wafer-assy (Aerial)	3115 108 40231	Screw for fixing :— Dial	3115 108 70641
switch wafer-assy (Oscillator)	3115 108 40241	Bottom plate/Back plate	2522 123 07009
Drum for gang condenser	3115 204 00141	Washer for fixing :— Dial	3115 200 40171
Lamp holder	3115 100 10051	Back plate	2522 600 17019
Spindle assy (Wave range)	3115 208 01341		
Tuning spindle	3115 208 01431		
Spring for drive cord	3122 996 45671		
Wedge for fixing switch assy	3115 101 20811		
Ball (for Band switch)	2622 890 00807		

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R2 (1M ohms) ...	2315 202 42105	C11 (525 pf) ...	2215 555 26012
R3 (15K ohms) ...	2115 104 04153	C12 (25 pf) ...	2215 551 00013
R4 (18K ohms) ...	2115 104 06183	C13 (395 pf) ...	2215 555 26004
R5 (33K ohms) ...	2315 202 62333	C14 (30 pf) ...	2215 803 20001
R6 (68 ohms) ...	2315 202 62689	C15 (27 pf) ...	2215 555 55279
R7 (47K ohms) ...	2315 202 62473	C16 (130 pf) ...	2015 300 96022
R8 (270K ohms) ...	2315 202 42274	C17 (50 pf) ...	2215 551 00014
R9 (1M5 ohms) ...	2315 202 32155	C18 (30 pf) ...	2215 803 20001
R10 (470K ohms) ...	2315 202 62474	C19 (56 pf) ...	2215 555 55569
R11 (82K ohms) ...	2315 202 62823	C20 (100K pf) ...	2215 311 51104
R12 (500K+1M7 ohms) ...	2315 350 14584	C21 (175 pf) ...	2215 551 00016
R13 (10M ohms) ...	2315 202 62106	C22 (3E3 pf) ...	2215 555 55338
R14 (750 ohms) × 2 ...	2315 202 62751	C23 (470 pf) ...	2215 555 55471
R15 (1K5 ohms) ...	2115 104 06152	C24 (10 pf) ...	2215 555 55109
R16 (220K ohms) ...	2315 202 42224	C25 (100 pf) ...	2215 555 55101
R17 (3K3 ohms) ...	2315 202 42332	C26 (100 pf) ...	2215 555 55101
R18 (50K+420K ohms) ...	2315 353 14573	C27 (130 pf) ...	2015 300 96002
R19 (3K3 ohms) ...	2315 202 42123	C28 (220 pf) ...	2015 300 08221
R20 (100K ohms) ...	2315 202 62104	C29 (8K2 pf) ...	2215 563 02822
C1 (25 pf) ...	2215 551 00013	C30 (33 pf) ...	2215 555 55339
C2 (30 pf) ...	2215 803 20001	C31 (3K3 pf) ...	2215 563 02332
C3 (27 pf) ...	2215 555 55279	C32 (3K3 pf) ...	2215 563 02332
C4 (30 pf) ...	2215 803 20001	C33 (25 mf) ...	2215 001 16259
C5 (27 pf) ...	2215 555 55279	C34+C35 (32+32 mf) ...	2015 199 00002
C6 (270 pf) ...	2015 300 96016	C36 (8K2 pf) ...	2215 561 06822
C7 (130 pf) ...	2015 300 96002	C37 (3K9 pf) ...	2215 555 55392
C8 (220 pf) ...	2215 555 55221	C38 (3K9 pf) ...	2215 555 55392
C9/10 (488 pf) ...	2215 806 10012	C39 (220 pf) ...	2215 563 02221
		C40 (220 pf) ...	2215 565 02221

Note :—For code number of other electrical parts, refer circuit diagram.

*In the circuit diagram and R.F. circuits the value of R5 is shown as 15K ohms. It should be 33K ohms.

MECHANICAL PARTS (Change of Parts) for 15RB525/00Z/11Z

Description	Code No.	Description	Code No.
Cabinet ...	3115 103 00161	Knob (Tuning) ...	3115 108 02651
Ornamental ring ...	3115 105 10411	Knob (Tone & Volume) ...	3115 108 02661
Ornamental plate ...	3115 105 10751	Knob (Waverange) ...	3115 108 02671
Dial 15RB525/00Z ...	3115 105 00721	Spring—Knob ...	3115 101 00351
Dial 15RB525/11Z ...	3115 105 10821	Spindle—Waverange ...	3115 108 02681
Grille ...	3115 105 10721	Spindle—Tuning ...	3115 108 02641

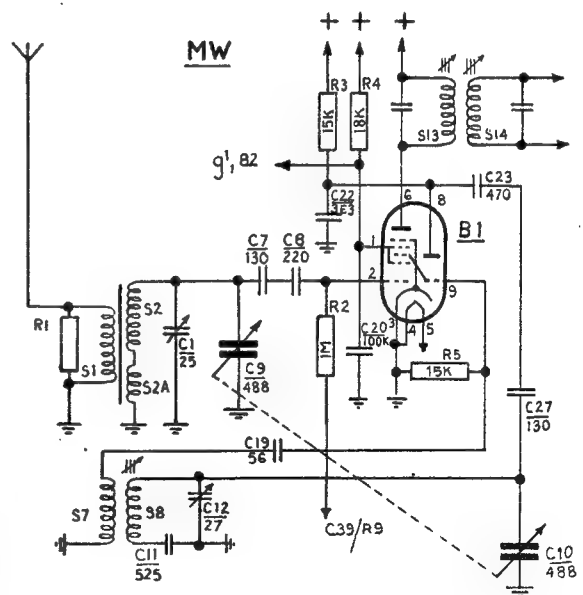
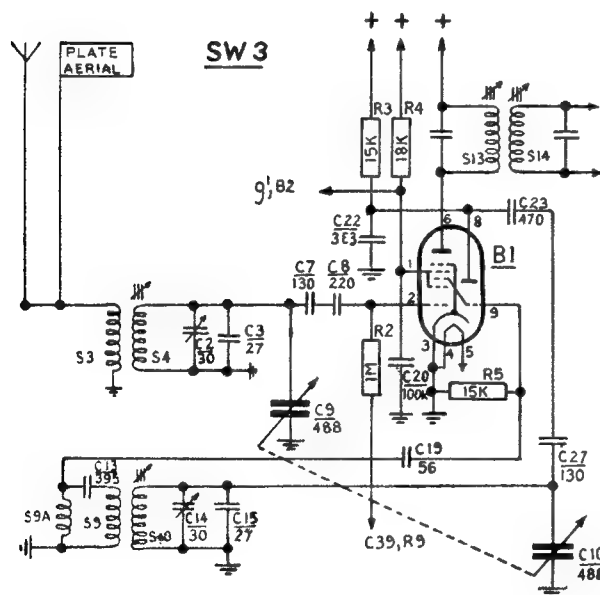
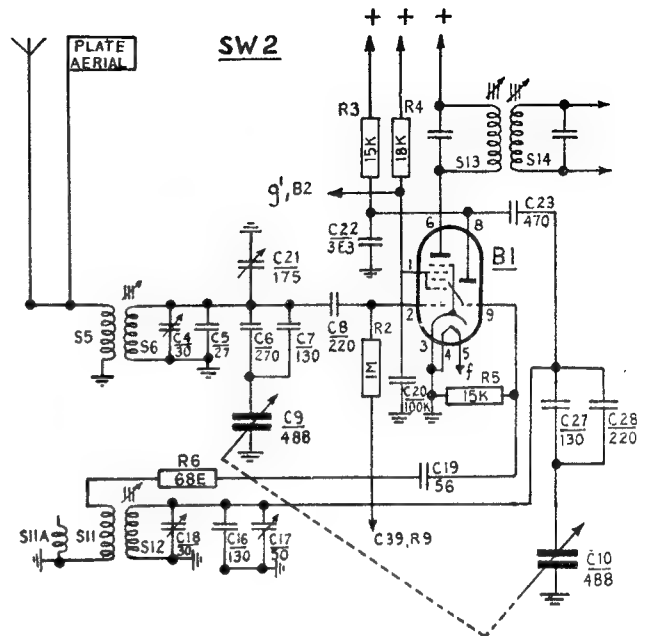
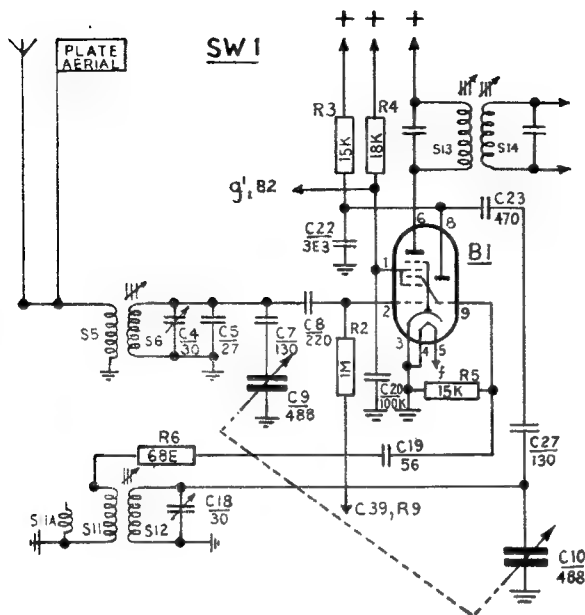
ELECTRICAL PARTS (Change of Parts) for 15RB525/00Z/11Z

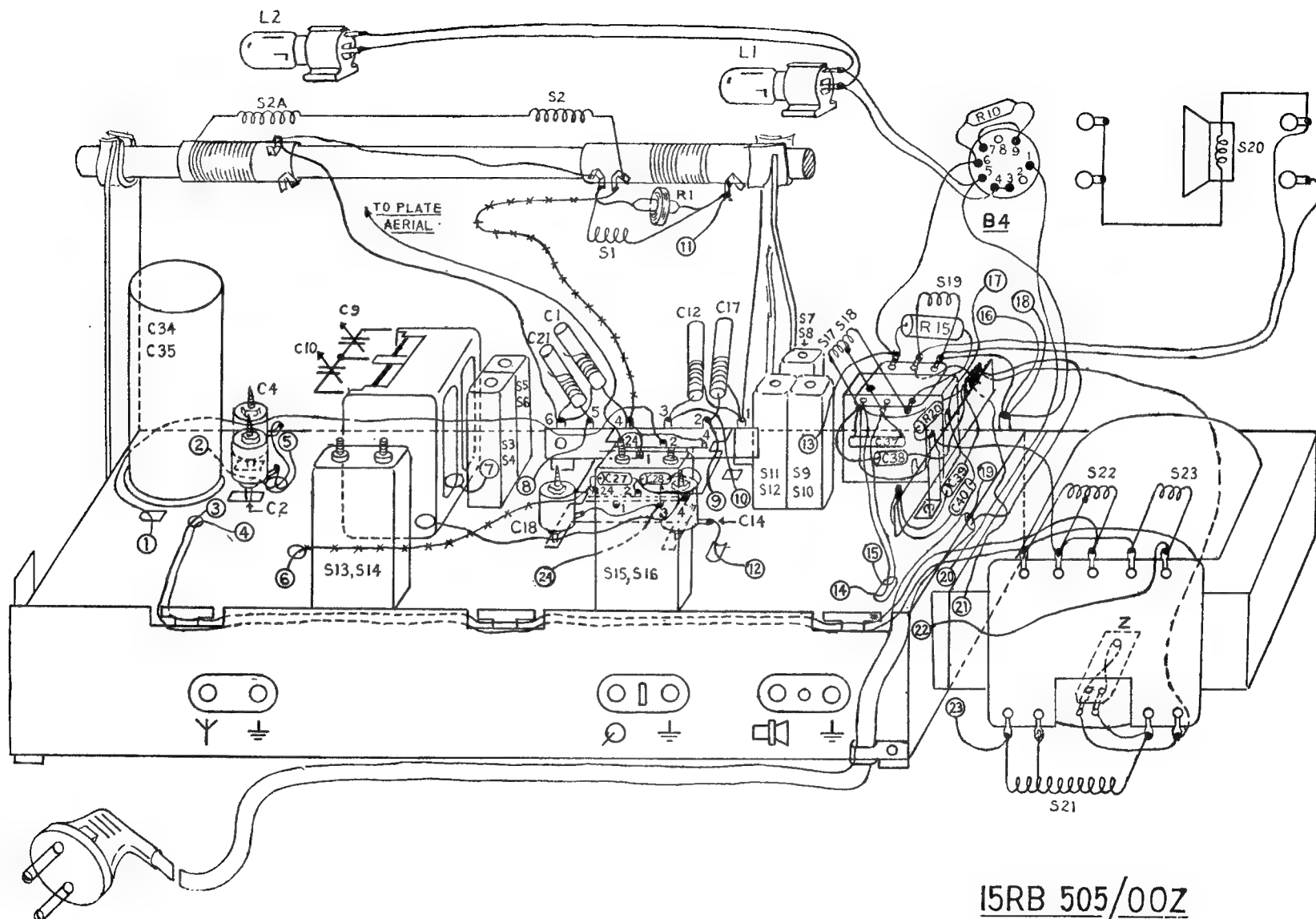
Part No.	Code No.	for Models
S20 (Z=4 ohms) ...	2415 257 37801	15RB525/11Z
R12 (500K+1M7 ohms) ...	2315 350 13884	15RB525/00Z/11Z
R18 (50K+420K ohms) ...	2315 353 13873	15RB525/00Z/11Z
C3 (39 pF) ...	2215 555 55399	15RB525/11Z
C5 (39 pF) ...	2215 555 55399	"
C9/C10 (518 pF) ...	2015 806 00101	"
C12 (50 pF) ...	2215 551 00014	"
C15 (47 pF) ...	2215 555 55479	"
C17 (175 pF) ...	2215 551 00016	"
C21 (275 pF) ...	2215 551 00017	"
*C42 (6K2 pF) ...	2015 300 96015	"

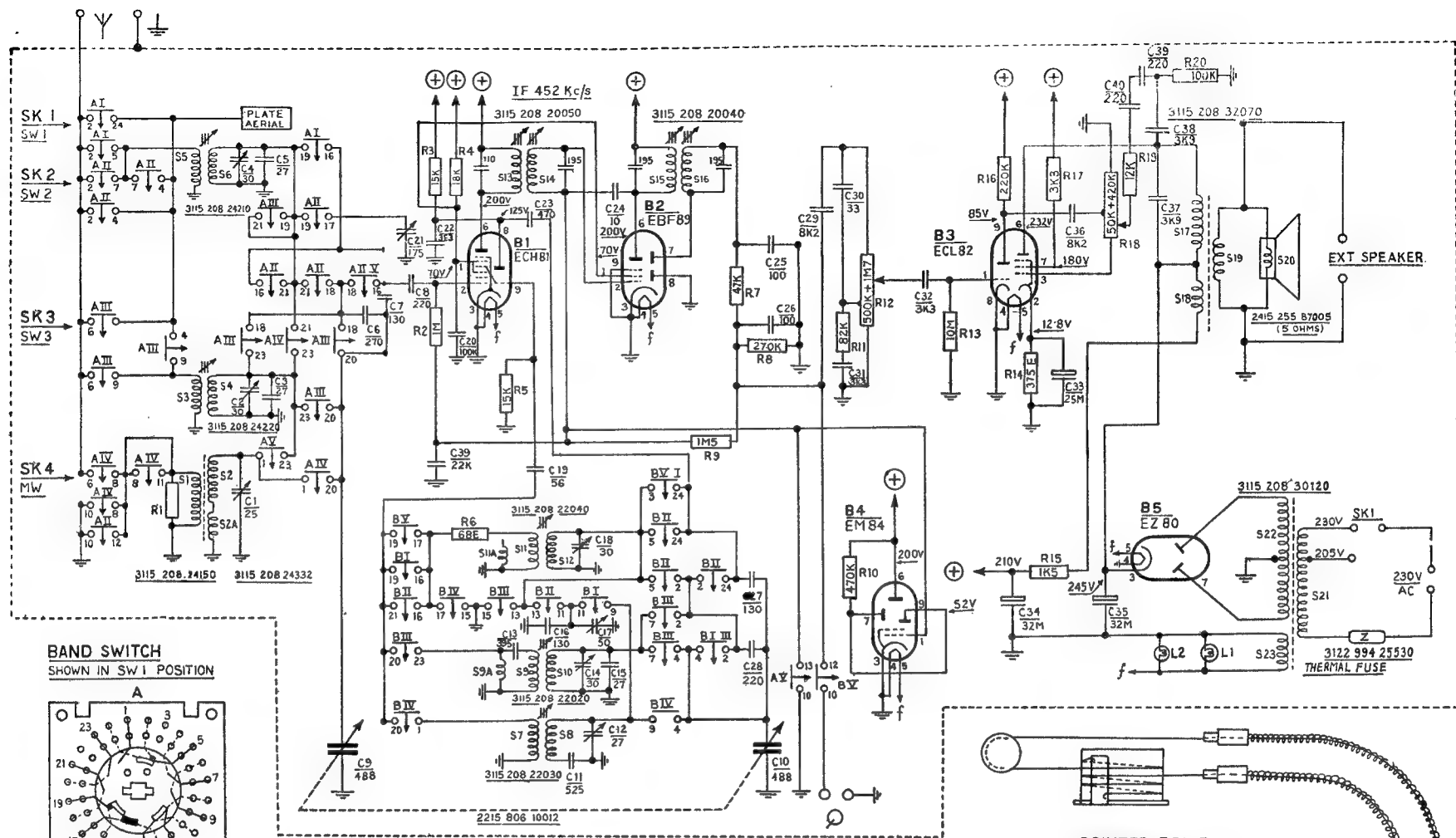
*(Capacitor added between the junction of S10/C14/C15 and contact point 7 of Oscillator switch section).

Drive cord length ...	730 mm & 550 mm	15RB525/11Z
instead of ...	714 mm & 545 mm	"

RF CIRCUITS.







POINTER DRIVE
VARCO IN MAXIMUM CAPACITY.

15RB 505/002
CIRCUIT DIAGRAM

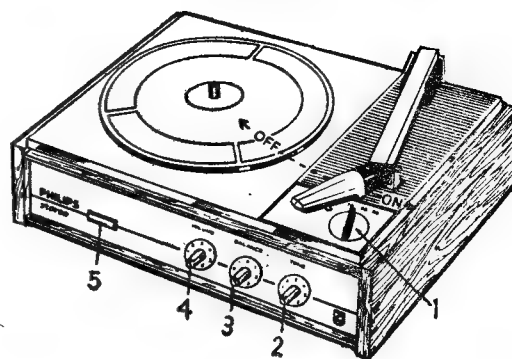
(714 m m CORD)

(545 m m CORD)



PHILIPS Service manual

GRAMOPHONES
15GC032 15GA632 15GF832



Year of release 1971

For 230 Volts AC Supply

15GF832 is a record player with stereo amplifier in wooden case with a transparent cover and two separate loudspeaker boxes.

15GA632 is a record player in wooden case with a transparent cover.

15GC032 is a record player.

15GF832

Technical data

Mains voltage : 230 volts AC 50 HZ
Power consumption : 20 watts
Output power : 2 × 2 watts
(at 10% distortion)
Pickup head : 15GP224
Loudspeaker box : 15RH401
Loudspeaker (type) : 2415 255 87004 (5 ohms)
Consumption (amplifier) : 35 to 45 mA DC
(without signal)
Transistors & Diodes : 2 × BC149C, 2 × AC126,
2 × CD2A, 2 × BY126
AC187/01 & AC188/01
(2 pairs)

Record player : 15GC032

Controls and indicators :

1. Speed selector
2. Tone control
3. Balance control
4. Volume control
5. Pilot lamp

Adjustment of current of output transistors :

Replace speakers by 5 ohms resistive loads. Set both potentiometers R27, R28 in mid position. Switch on the apparatus. Adjust the quiescent collector current of TR5 and TR7 to 5mA ± 0.25 by connecting ammeter in series with the collector and by means of R27 and R28.

MECHANICAL PARTS

Description	Code No.	Description	Code No.
Front assy ...	3115 209 00191	Screws for fixing :	
Frame (wooden) ...	3115 203 00120	Front assy × 3 ...	2515 123 89009
Knobs × 3 ...	3115 208 02890	Case (bottom) × 2	2522 001 07171
Spring × 3 ...	2503 996 01001	Nut for fixing potmeters × 3 ...	3115 200 40260
Case (bottom) ...	3115 204 02421	Loudspeaker cord assy ...	2290 04915
Slide door ...	3115 204 02411	Record Player Assy	
Bush for loud- speaker sockets...	3115 208 02900	Mounting plate ...	3115 204 02840
Lampholder	3115 100 10050	Rubbermat ...	3115 208 03350
Grommet for mount- ing transformers × 4	3115 204 02560	Turntable ...	3115 208 03250
Loudspeaker socket plate assy ...	3115 209 00181	Disc. (speed change knob) ...	3115 204 03111

For other spares of record player assy refer to parts list for 15GA632.

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R1/R4 (220K) ...	2322 390 74412	C17/C18 (500 mF)	2215 001 41501
R5/R6 (470K) ...	2322 390 74496	C19/C22 (64mF) ...	2215 001 14649
R9/R10 (50K+170K) ...	2322 390 74483	C20/C21 (1 mF) ...	2215 002 17108
R27/R28 (220 ohms)	2315 411 02202	C23/C24 (640 mF)	2215 023 44641
R31/R32 (120 ohms)	2115 611 00003	C25/C26 (1000 mF)	2215 023 45102
C9/C12 (500 mF) ...	2215 001 41501	Loudspeaker ...	2415 255 87004
C10/C11 (320 mF)	2215 001 43321	L1 (6.3 V 115 mA)	3115 109 10020
		Z1/Z2 (thermalfuse)	3115 208 02831

15GA632—MOUNTED RECORD PLAYER ASSEMBLY

PARTS LIST FOR 15GA632

REFER FIGURES (1), (2) and (3)

Pos. No.	Description	Code No.	Pos. No.	Description	Code No.
1.	Mounting Plate	... 3115 204 01010	34.	Retaining ring	... 2522 634 04004
2.	Spring	... 3115 151 00420	35.	Spring	... 3115 201 00270
3.	P. U. Arm	... 3115 208 01510	36.	Spring	... 3115 201 00300
4.	Spring	... 3111 151 01350	37.	Motor	... 3115 208 70050
5.	Block	... 3111 154 01280	38.	Retaining ring	... 2522 634 04007
6.	Disc	... 3115 204 01420	39.	Grommet	... 3111 154 00670
7.	Plate	... 3111 150 00030	40.	Rod	... 3111 151 00480
8.	Rubber cover	... 3115 208 03340	41.	Screw	... 2515 123 89002
9.	Turn table	... 3115 208 01470	42.	Washer	... 2522 600 17018
10.	Washer	... 3111 154 01550		Base	... 3115 203 00111
11.	Cup	... 3111 151 21240		Lid	... 3115 204 02391
12.	Spindle	... 3111 151 21100		Leg	... 3104 104 70221
13.	Ornamental plate	... 3111 151 60590		Screw for mounting	
14.	Trip lever assembly	... 3115 209 00271		Record player	... 2522 001 07194
15.	Spring	... 3111 151 00410		Philips word	
16.	Spring	... 3115 201 00311		emblem on base	... 3115 200 00041
17.	Wheel	... 3111 158 01300		Emblem on Lid	... 3122 998 25331
18.	Ring	... 3104 103 40240		Mains cord with plug	... 3115 108 50151
19.	Idler wheel			P. U. Cord assy	... 3115 208 50111
20.	bracket assembly	... 3115 209 00281		Plug for P.U. cord.	... 2422 024 00001
21.	Spring	... 3115 201 00250		Do	... 3115 300 20101
22.	Nut	... 2522 401 04011		Do	... 3115 200 20091
23.	Spring	... 3115 201 00290		P.U. head	... 9015 352 24007
24.	Washer	... 2522 600 17027		Stylus	... 3104 108 02181
25.	Bush	... 3115 201 60290		Grommets on	
26.	Sector	... 3111 151 60060		casing for cords	... 3104 104 03691
27.	Spring	... 3115 201 00260		Adapter for 7" Record...	3104 104 01501
28.	Washer	... 3104 103 40260		Protective cap	
29.	Washer	... 3104 103 40230		for P.U. Head	... 3104 104 03921
30.	Rod	... 3111 151 00450		Spindle for fixing motor...	3111 151 20710
31.	Switch	... 3111 158 40010		Pick-up mount	... 3115 208 03391
32.	Rod	... 3111 151 00440		Shielded wire in P.U. arm	3115 208 01731
33.	Spring	... 3115 201 00280		Plate in P.U. arm	... 3104 101 60971
33.	Ratchet	... 3115 151 21210			

15GC032—Record player chassis.

For parts list and diagram ref. 15GA632 except for wooden base and transparent lid.

Code number of mounting spring is 3115 201 00320.

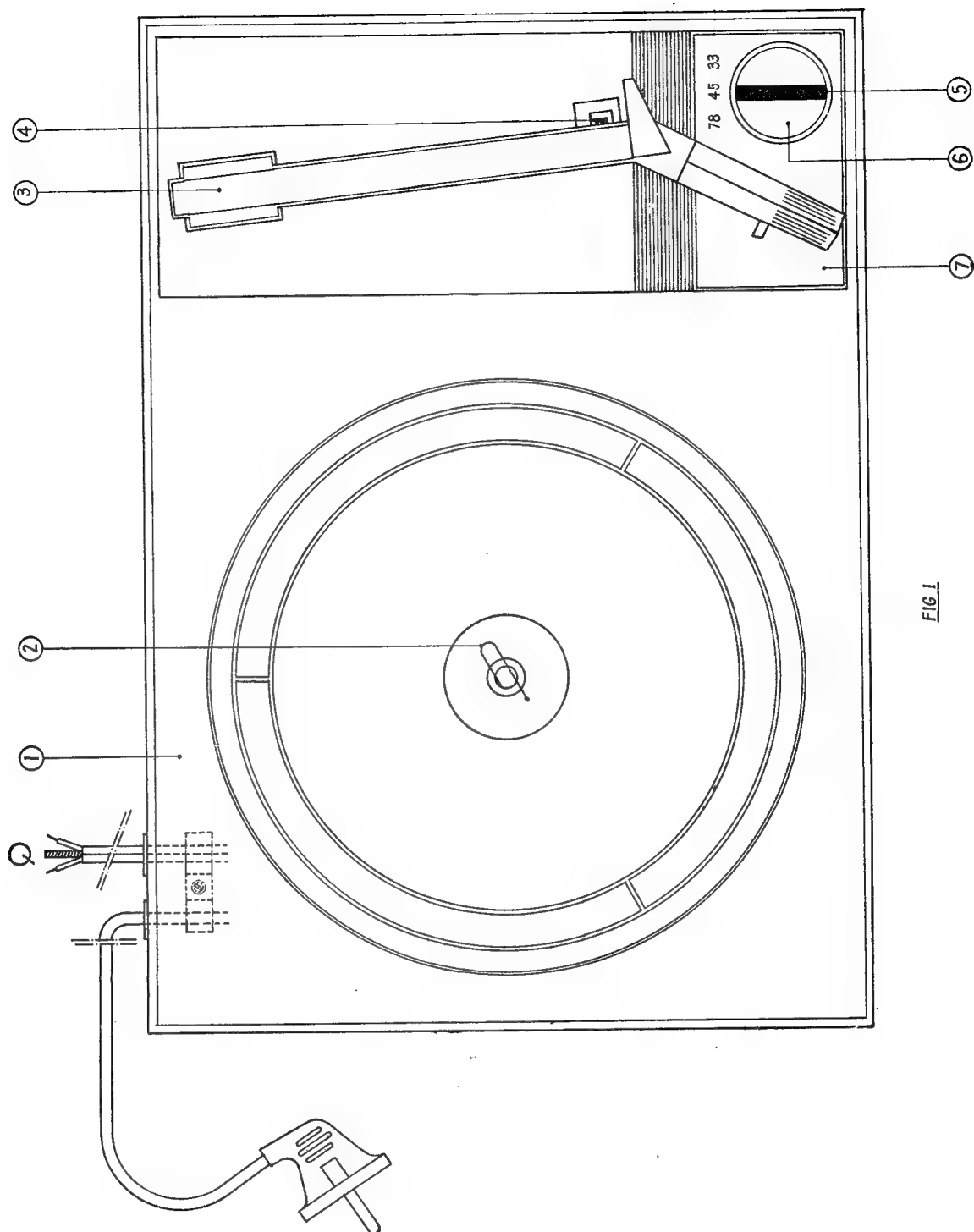
Technical specification :—

Mains voltage	: 230 volts AC-50 HZ
Power consumption	: 11 watts
Speeds	: 33-1/3, 45 and 78 r.p.m.
Pickup head	: 15GP224
Stylus pressure	: 4 to 6 gms.

Caution

Do not apply any oil or grease to motor bearings/shaft.

These are already lubricated with special oil in factory.

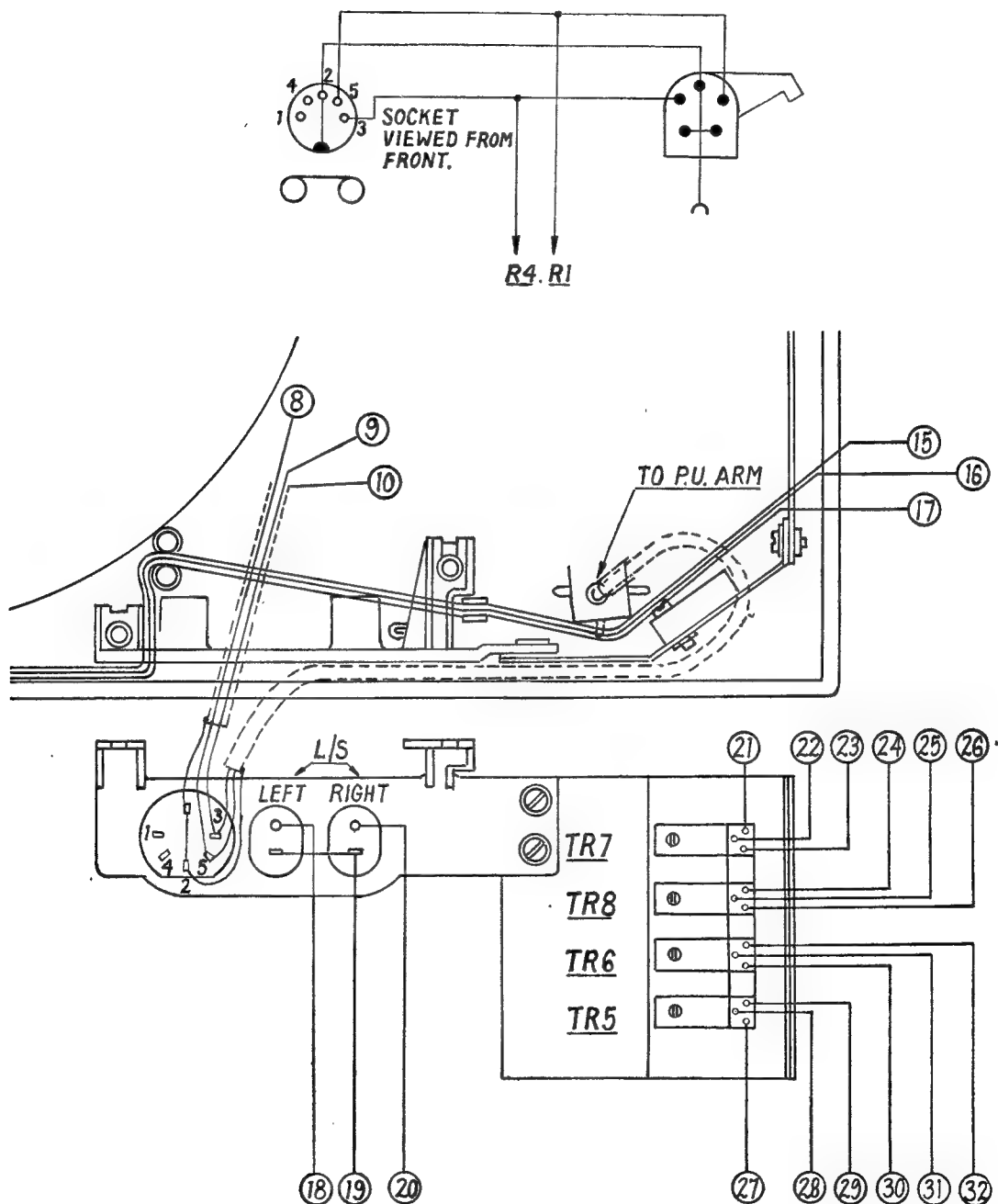


STEREO ELECTROPHONE 15GF832/00S

In the above model, factory have introduced tape socket starting from serial number 09835 onwards.

As a service solution for introduction of tape socket in 15GF832 produced earlier, the following procedure may be followed :

1. Replace the old socket piece assy code number 3115 209 00181 by new socket piece assy code number 3115 209 00210.
 2. Replace the old bush for loudspeaker socket code number 3115 209 02900 by new bush code number 3115 204 03561.
 3. Modify wiring of pick-up lead and tape socket as shown in the following diagram.
- modified wiring diagram with socket for tape recording



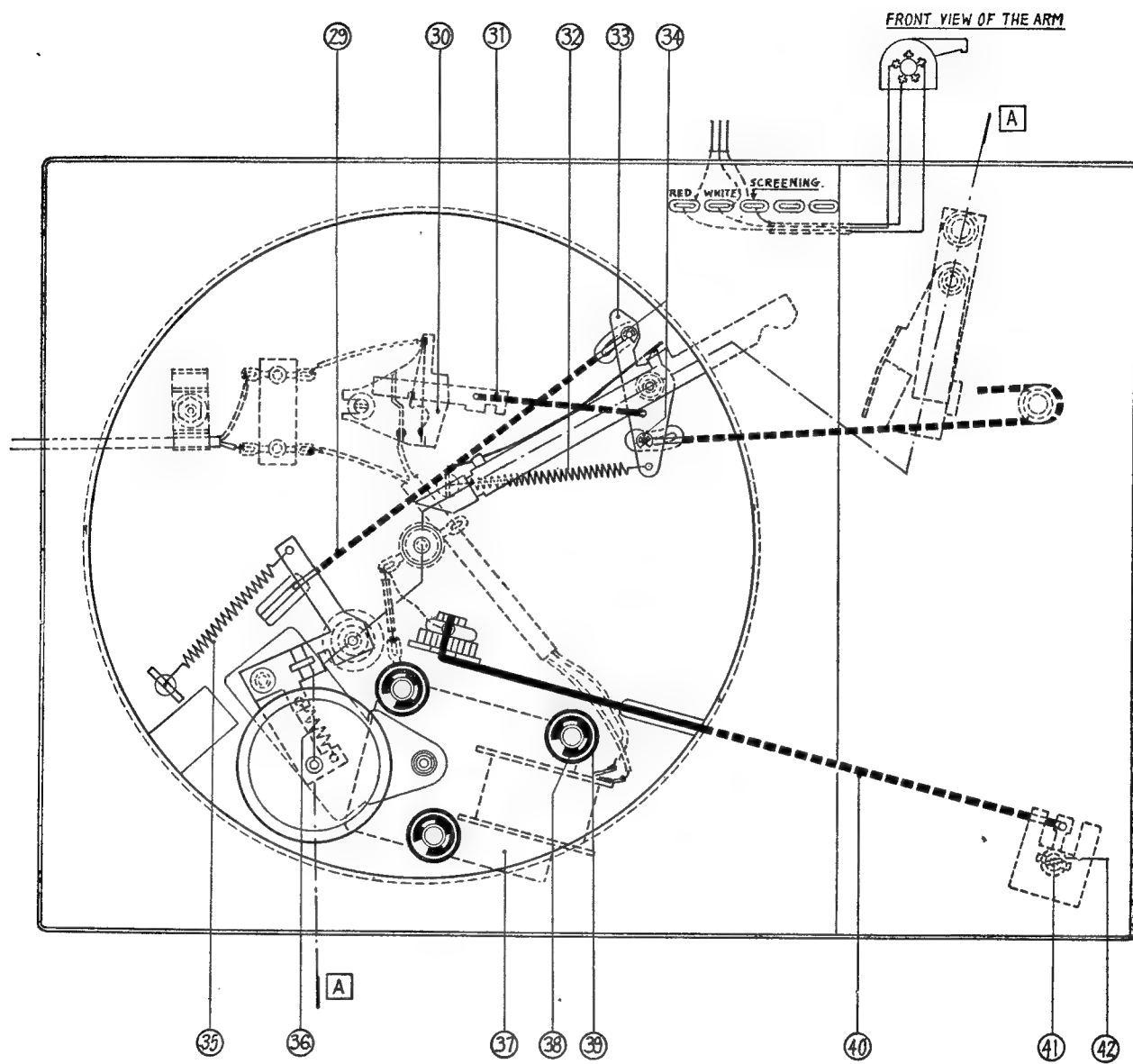


FIG. 2

A-A

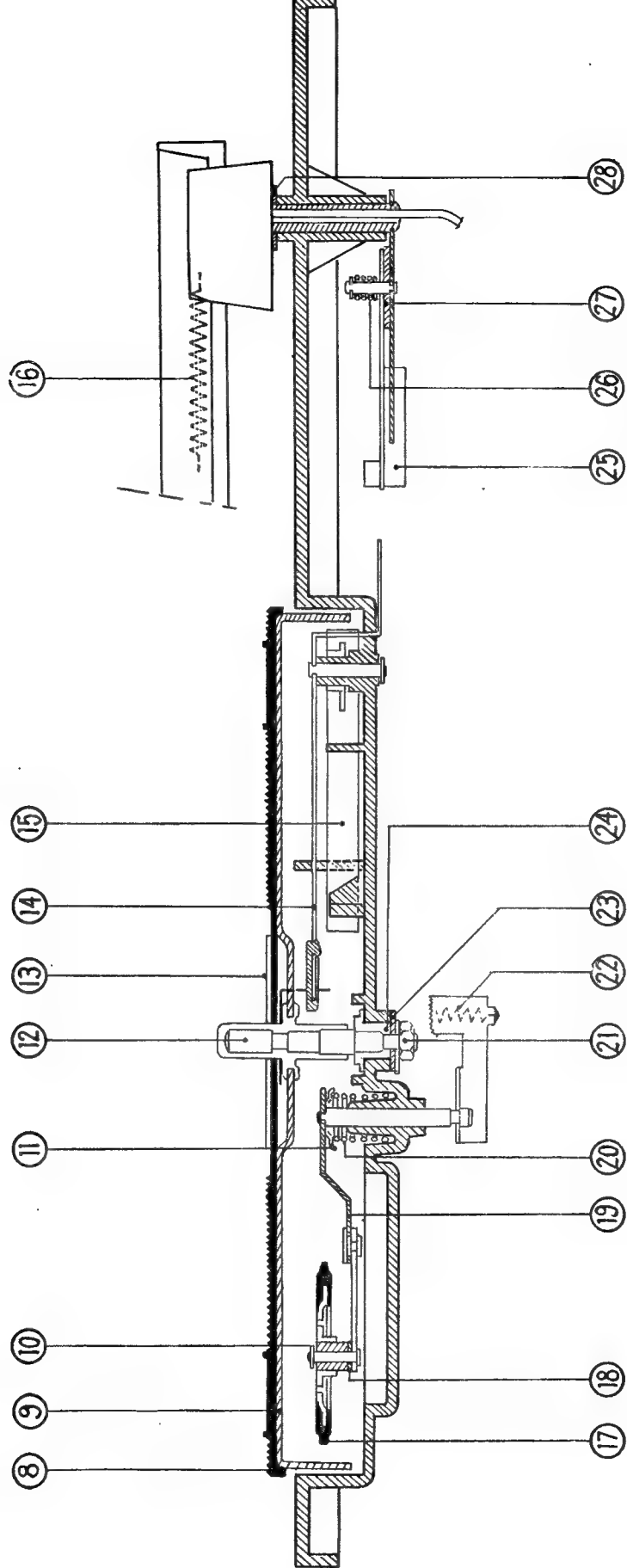
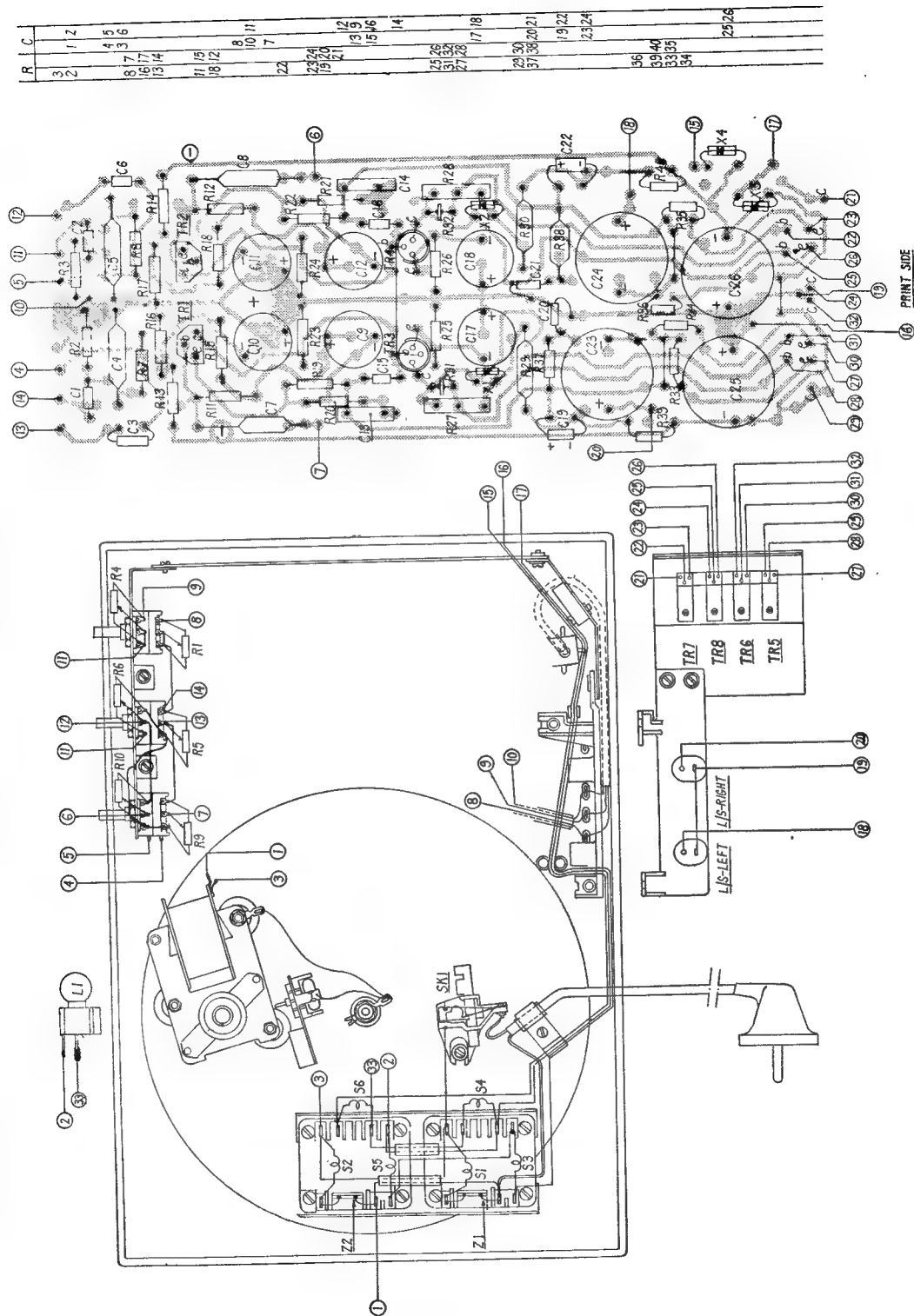
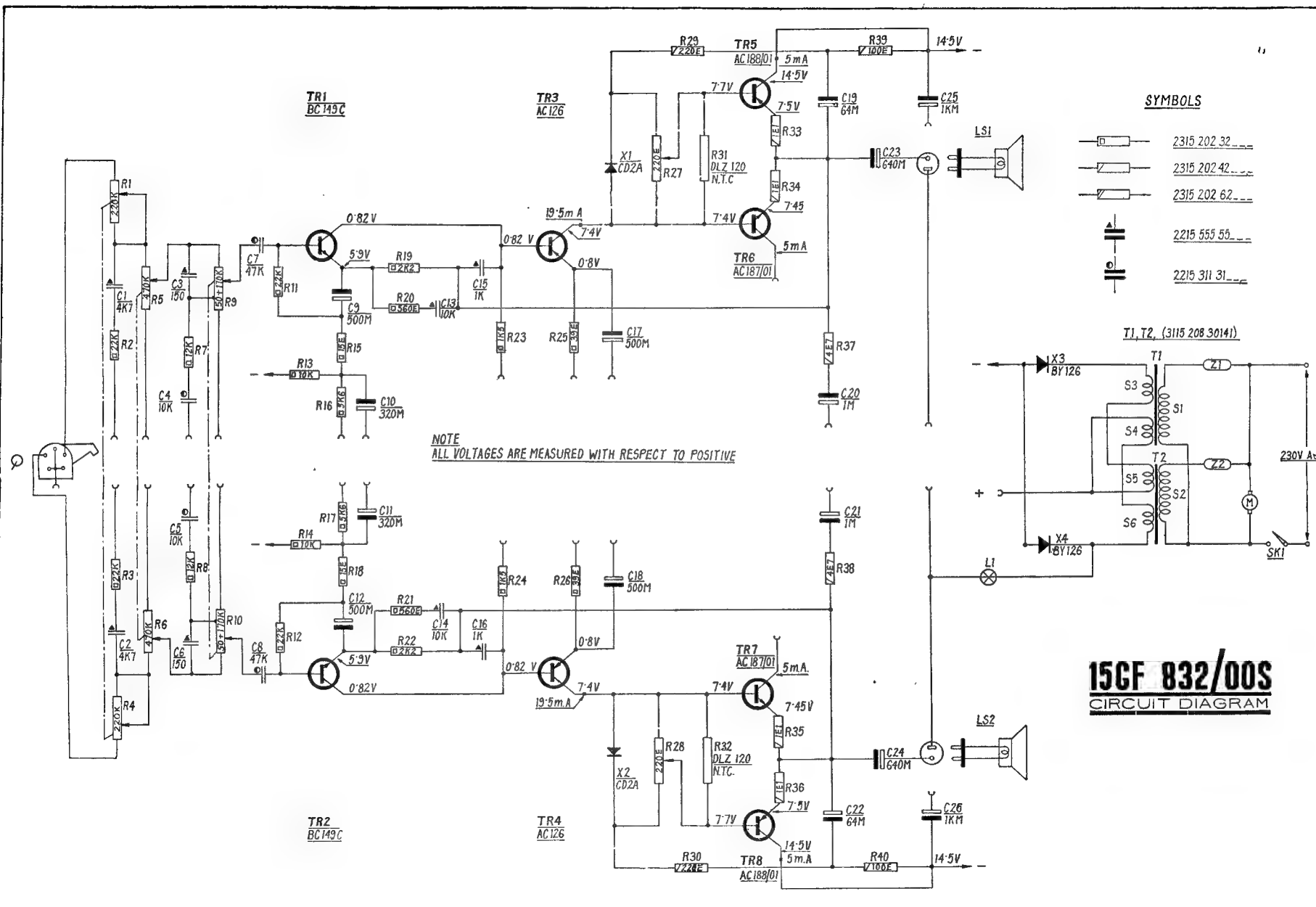


FIG 3

R: 41 Z1, Z2, S1, S2, S3, S5 S4, S6 SK1, L1, 9, 10, 5, 6, 1, 4, TR5, TR6, TR7, TR8, XI, TR3, TR1, TR4, TR2, X2, X3, X4



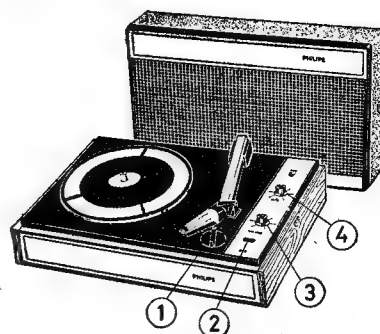
156F 832/00S
WIRING DIAGRAM





PHILIPS Service manual

GRAMOPHONES 15GF533



Year of release 1973

For 230 volts AC or 9 Volts Battery Supply

TECHNICAL DATA:

Supply voltage :

230 volts 50 Hz (AC) or

9 volts battery (6 × 1.5 volts cells — type R20)

Current consumption :

Approximately ± 300 mA for maximum output on 9V DC.

Output power :

2 watts (Music) on 230V AC

1.5 watts (Music) on 9V DC

Pickup head :

15GP224

Stylus pressure :

4 to 6 gms.

Loudspeaker :

2415 257 30205 (Z = 4 ohms)

Transistors and Diodes :

TR1 : BC148B

TR2 : AC126

TR3/TR4 : AC187/01 & AC188/01
(Matched pair)

TR5 : AC127

TR6 : AC128

D1, D4, D5 : 3 × CD2A

D2a & D2b : 2 × EC 051

D3 : DR 25

Indicator lamp :

CR 358 50 (6.3V — 0.115A)
(3115 109 10020)

Controls & Indicators :

(1) Speed selector — 78, 45, 33 1/3 r.p.m.

(2) Pilot lamp

(3) Volume control

(4) Tone control

At rear :

Loudspeaker socket

Tape/stereo socket

Regulation of speed :

Adjust potentiometer R 19 for correct speed by using stroboscopic disc.

Adjustment of current of output transistors :

Set potentiometer R15 to mid position. Adjust Quiescent collector current of transistor TR3 (AC188/01) to 5 ± 0.5 mA by means of potentiometer R15.

MECHANICAL PARTS

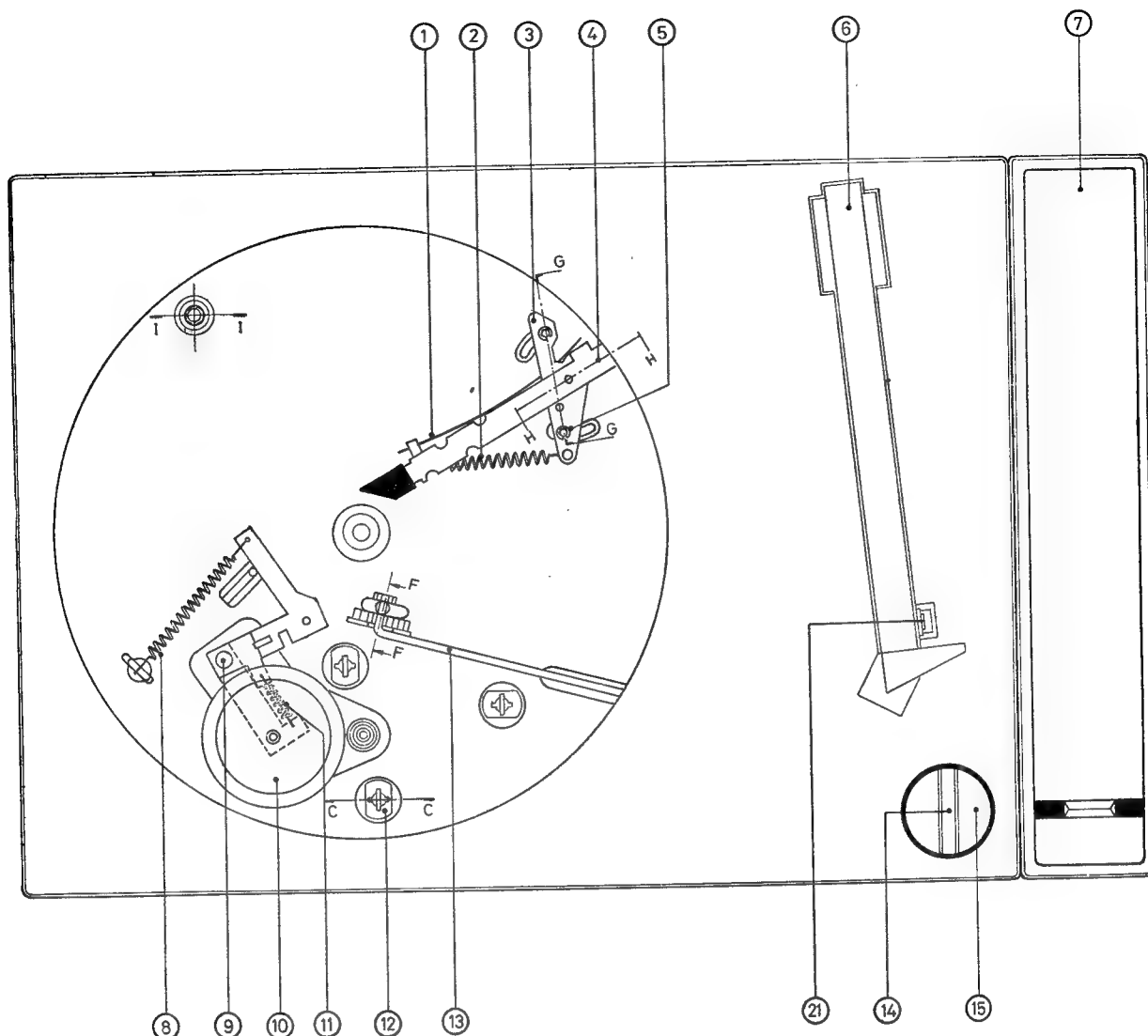
Description	Code No.
Under case assy	... 3115 209 00311
Lid assy (top)	... 3115 209 00491
Grille assy	... 3115 209 00471
Battery/Mains lead} × 2	... 3115 204 03621
Compartment door}	
Foot × 4	... 3104 104 70221
Cap (mains lead compartment)	... 3115 204 03611
Closure (lock) × 2	... 3104 103 40801 or 3115 208 04061
Ornamental strip (front)	... 3115 205 10811
Ornamental strip (back)	... 3115 205 10831
Ornamental strip (top of lid)	... 3115 205 10791
Ornamental strip (bottom of lid)	... 3115 205 10801
Handle bracket assy	... 3115 208 03951
Handle sleeving	... 3115 204 03691
Handle steel strip	... 3115 201 00821
Knob — volume/tone × 2	... 3115 208 03581
Spring for above	... 2503 996 01001
Battery contact (negative) × 3	... 3115 101 00171
Battery contact (positive) × 3	... 3115 100 20101
Cup for battery contacts × 2	... 3115 201 60921
Spring for battery contacts × 2	... 3115 201 00811
Ornamental plate for knobs	... 3115 205 10821
Indicator for lamp	... 3115 204 03661
Loudspeaker socket	... 2422 026 01017
Loudspeaker plug	... 2422 026 01021
Tape stereo socket	... 2422 026 00889
Mains cord assy	... 3115 208 50171
Loudspeaker cord assy	... 3104 108 70001
Centering piece (for 45 r.p.m. records)	... 3104 104 01501

MECHANICAL PARTS (Contd.)

ELECTRICAL PARTS

100

DIAGRAM 1



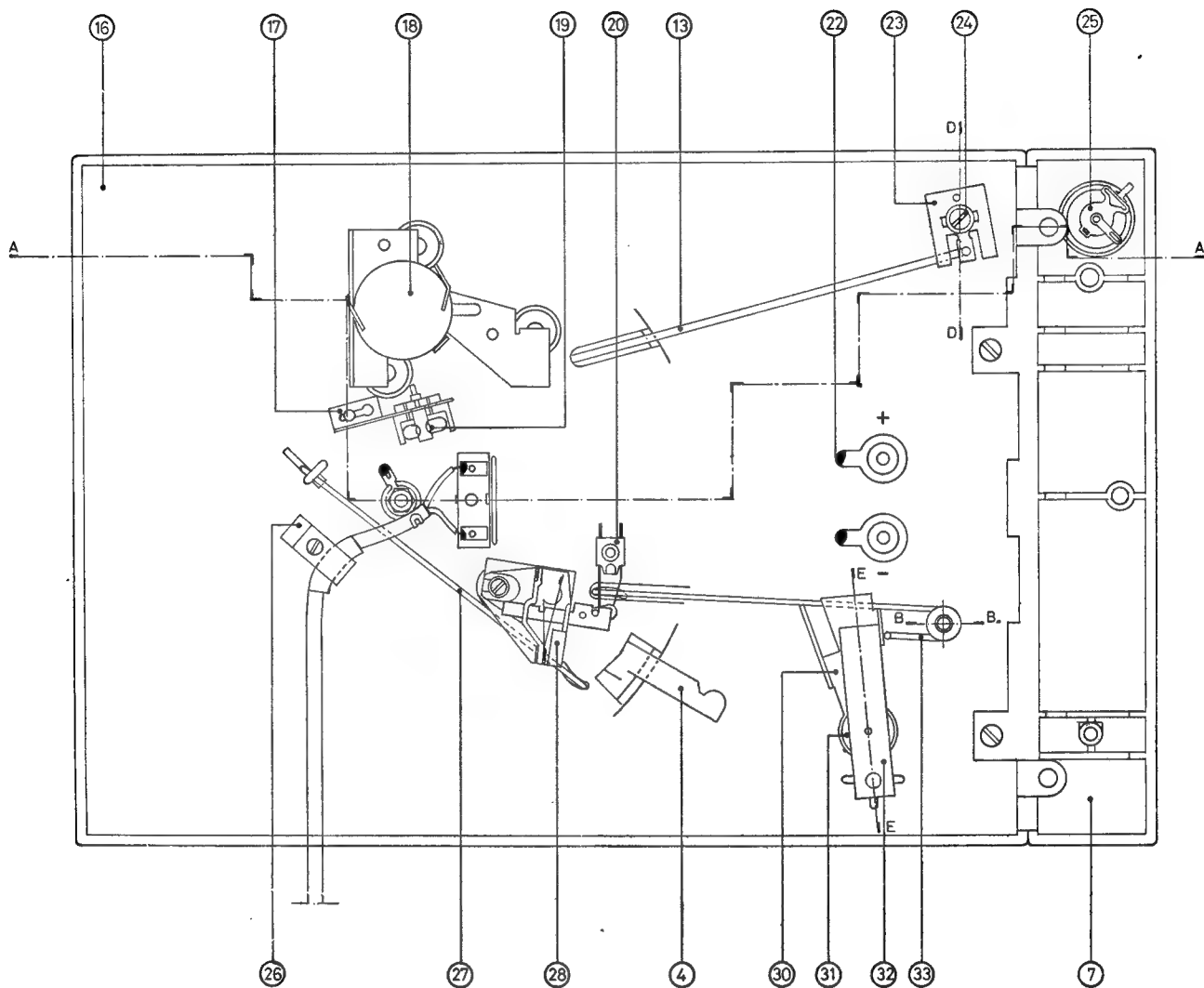
15GF 533/00
MECHANICAL LAYOUT.

During production of this receiver the following changes are introduced :

Description/Part No.	Deleted	Added	Part No.	Deleted	Added	
Contact cap	3111 120 40661	—	C1	2215 555 55472	2215 563 02332	... 3K3 pF
Spring	3115 201 00811	—	C6	2215 001 41501	2215 016 12331	... 330 MF
Cup for battery contacts	3115 201 60921	—	C7	2215 001 43321	2215 001 13201	... 200 MF
Block Heat Sink for TR 6-AC128		3322 060 03811	C11	2215 001 43321	2215 016 54331	... 330 MF
			R9	2315 202 32222	2315 102 33152	... 1K5 ohms
			R10	2315 202 32279	2315 102 33229	... 22 ohms
			R17	2315 202 32478	...	
			R20	2315 202 32181	2315 102 33271	... 270 ohms
			R23/R25	2315 202 32129	2315 102 33159	... 15 ohms

Note : (i) Value of R7 is 22K ohms instead of 27K ohms in the circuit diagram.
(ii) Value of R19 is 100 ohms instead of 220 ohms in the circuit diagram.

DIAGRAM 2



15GF 533/00
MECHANICAL LAYOUT

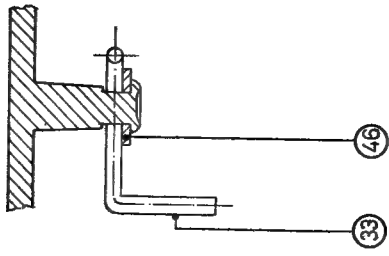
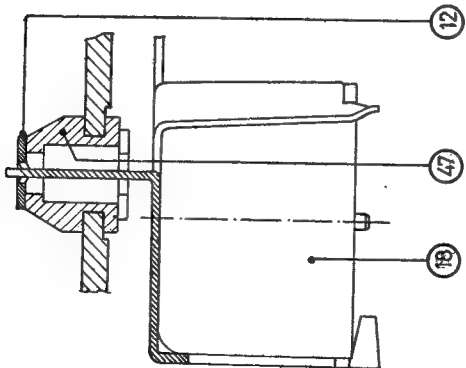
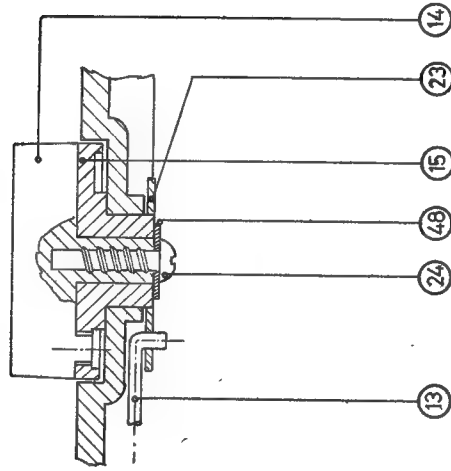
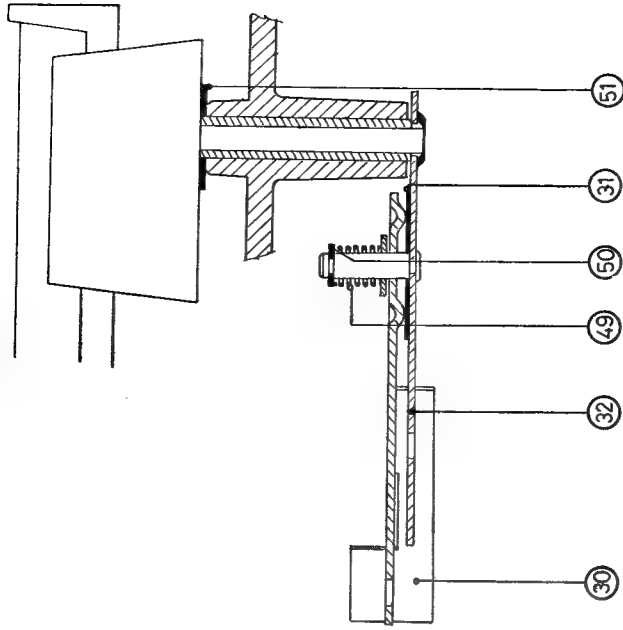
DIAGRAM 3

[B-B]

[C-C]

[D-D]

[E-E]



[I-I]

[F-F]

[G-G]

[H-H]

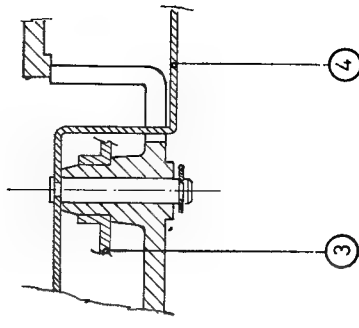
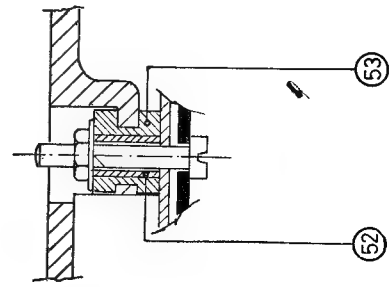
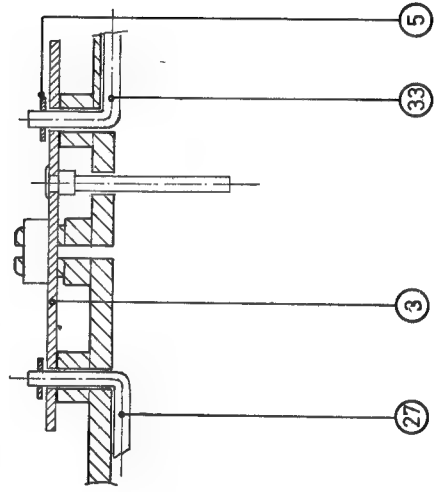
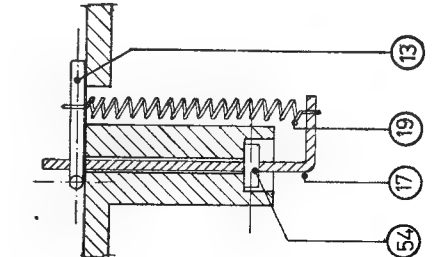
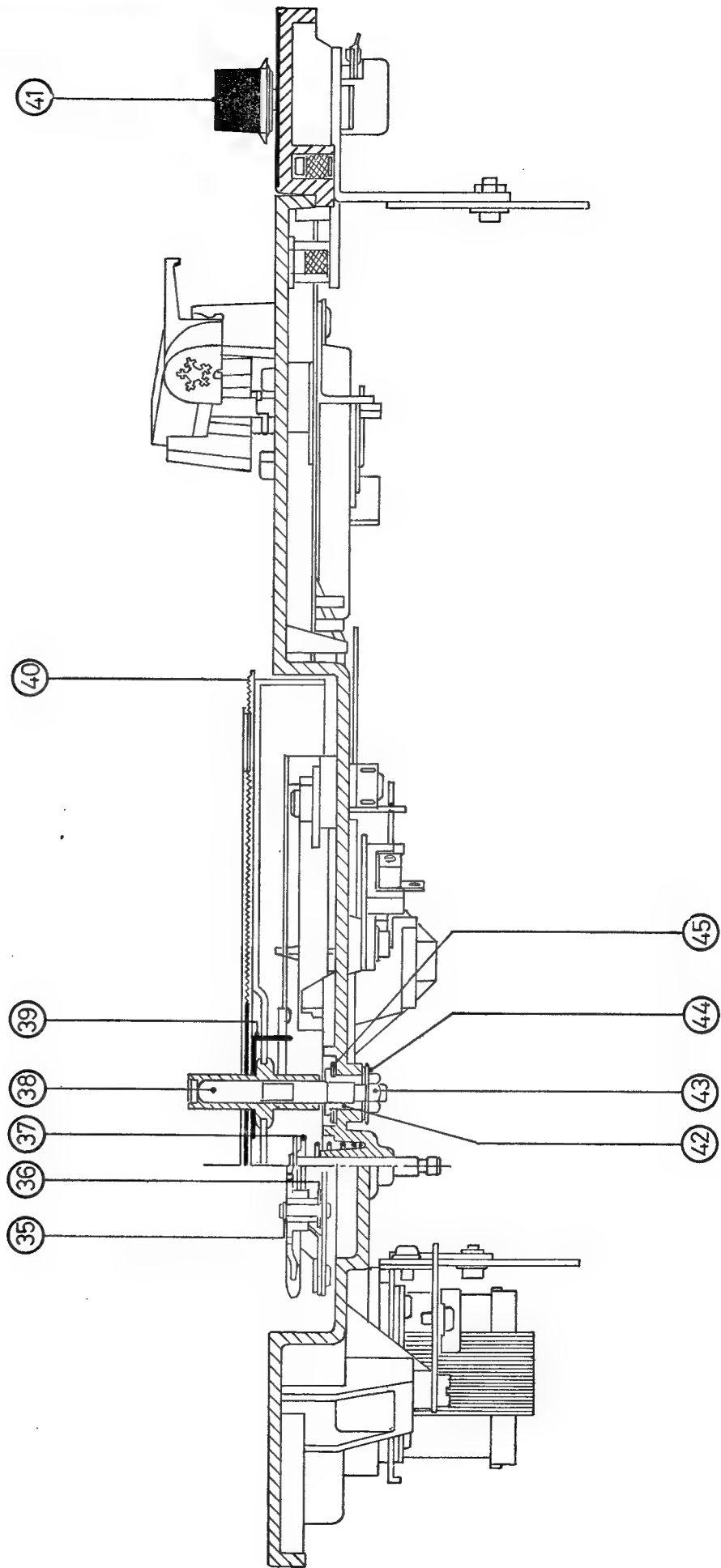
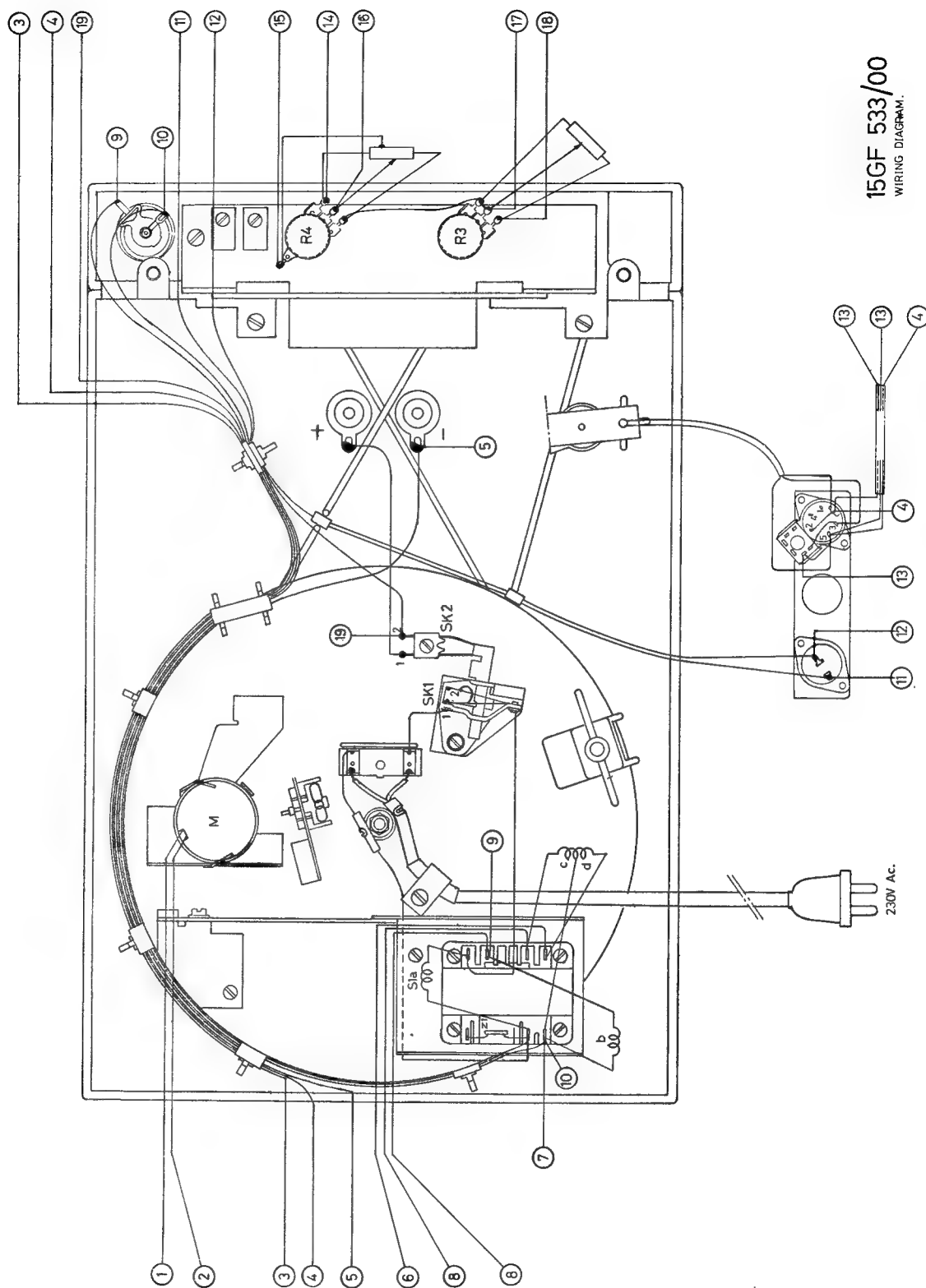


DIAGRAM 4

A-A



R	M	Z1	Slab.c.d.	M.	SK1.	SK2.	4, 15.	L1.	R	M
---	---	----	-----------	----	------	------	--------	-----	---	---

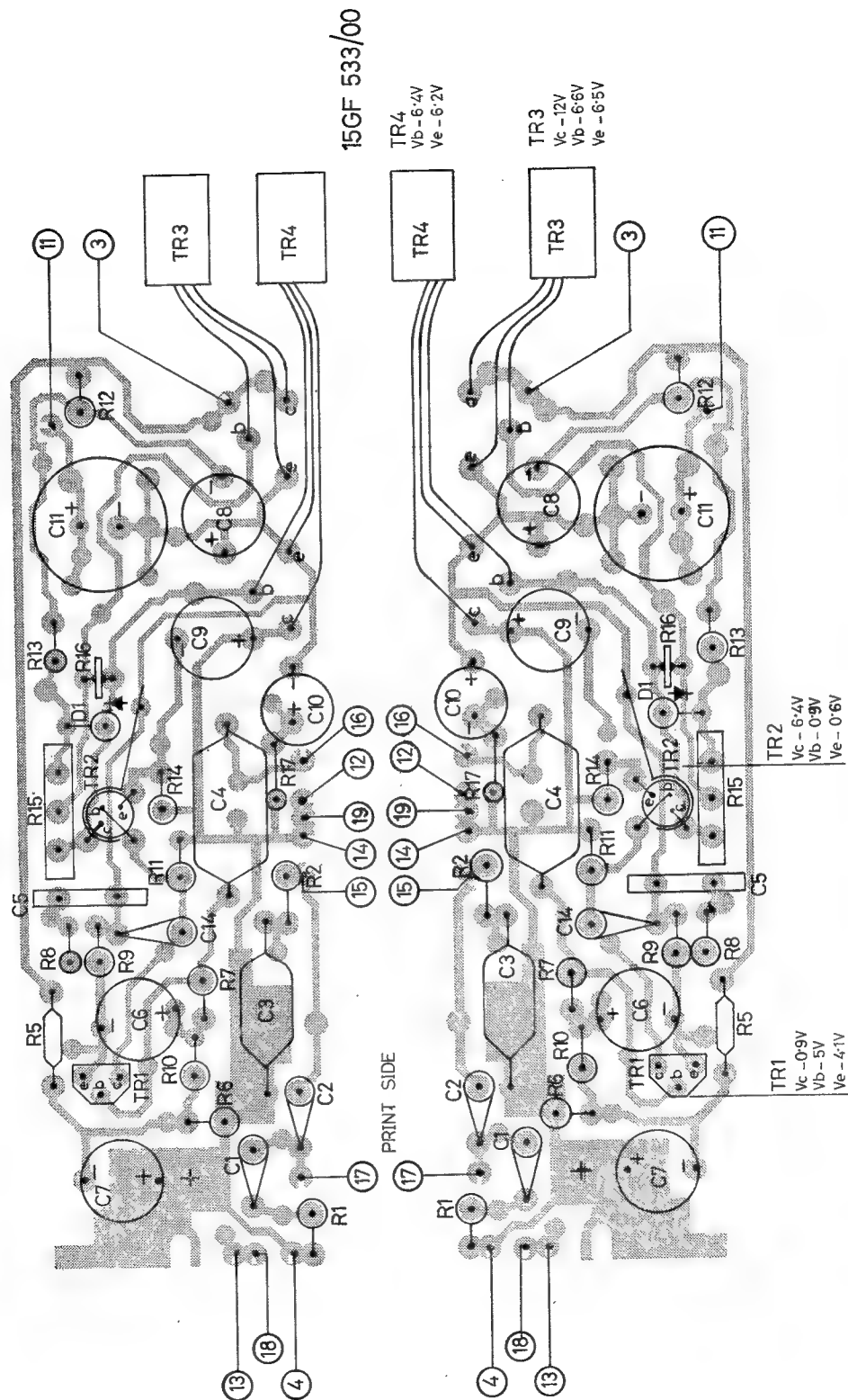


15GF 533/00
WIRING DIAGRAM.

R	1.	6.10.5.	7.8.9.	2.11.	15.17.14.	13.16.	12.	R
C	7.1.	2.6.3.	14.5.	4.	10.9.	11.8.		C
M		TR1.		TR2.	D1.	TR3. TR4.		M

AMPLIFIER UNIT.

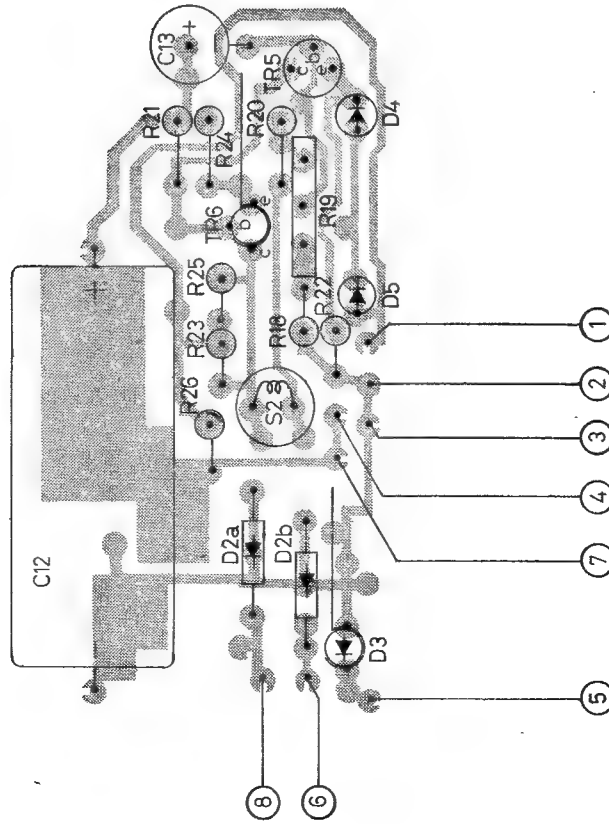
COMPONENT SIDE.



R	1.	6.10.5.	7.8.9.	2.11.	15.17.14.	16.13.	12.	R
C	7.1.	2.6.3.	14.5.	4.	10.9.	8.11.		C
M		TR1.		TR2.	D1.	TR3. TR4.		M

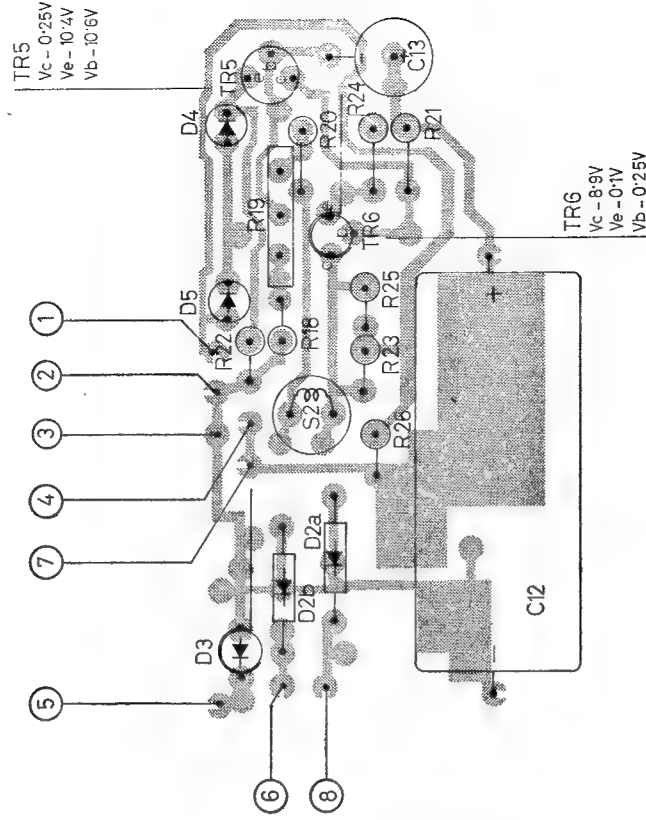
R	26.	23.18.27.25.	19.	24.20.21.	13.	26.	23.22.18.25.	19.	20.21.24.	R		
C	12.					12.				C		
M	D3.	D2a.D2b.	S2.	D5.	TR6.	D4.	TR5.	D5.	TR6.	D4.	TR5.	M

COMPONENT VIEW.



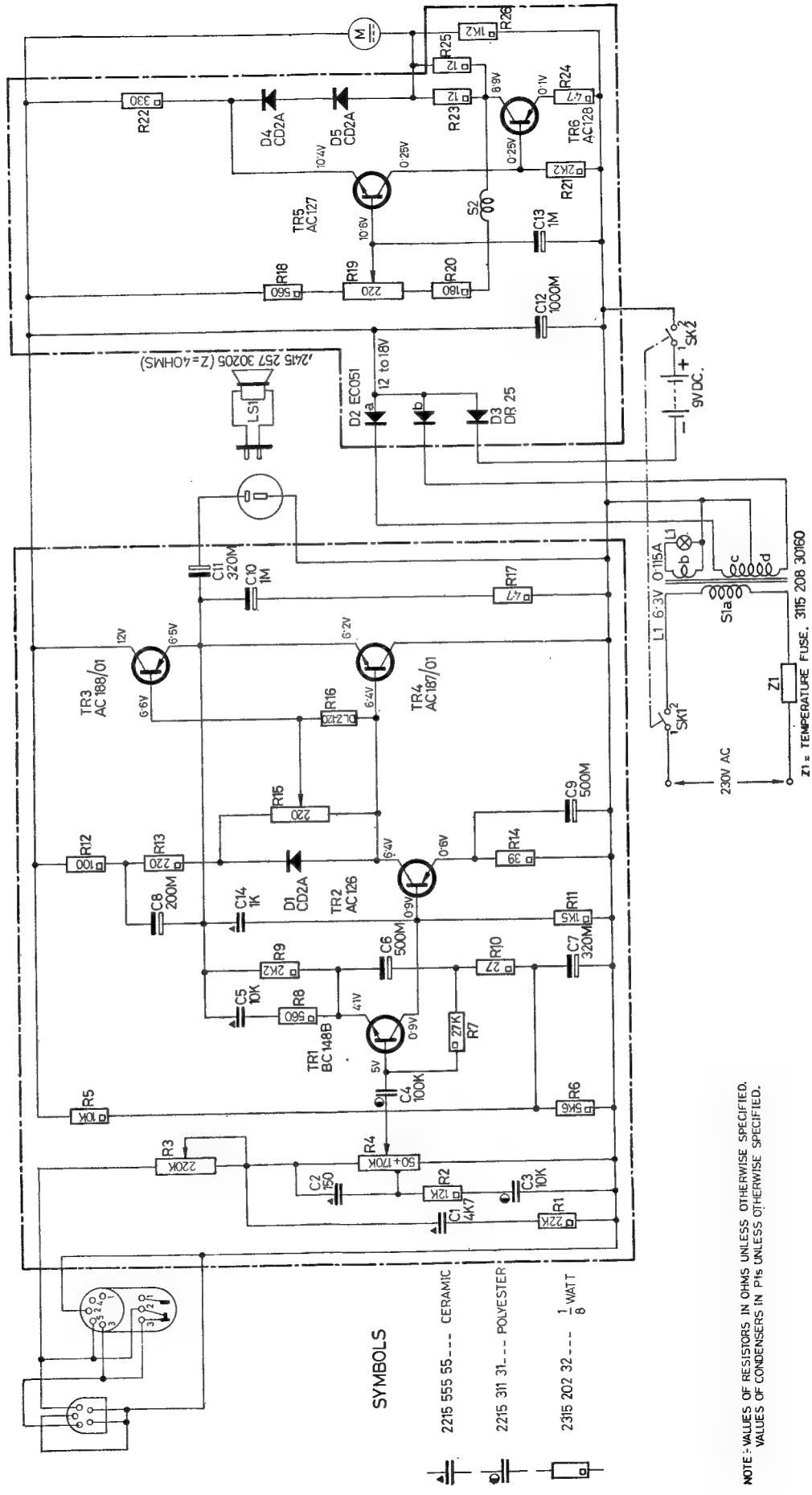
GOVERNOR UNIT.

PRINT VIEW.



15GF 533/00

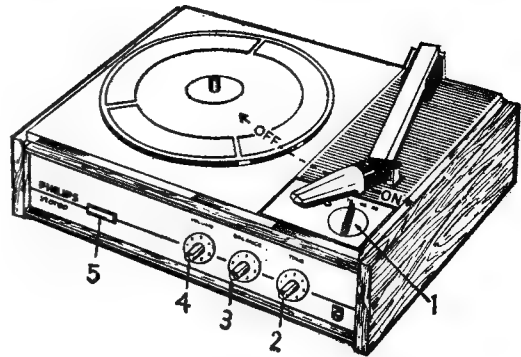
R	1	2	3	5	7	8	9	11	12	15	16	17	18	21	22	24	26	R
R	1	2	3	4	6	10	13	14	15	16	17	18	19	20	23	25		R
C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	C
C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	C
M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	M





PHILIPS Service manual

Gramophones 15GF832/06 & 06S



Year of release 1972

For 230 Volts AC Supply

15GF832/06S is similar to 15GF832/06 except for knobs.

Output power
2×3 watts.

Technical Data :

Recordplayer
15GC032

Pickup Head
15GP224

Stylus pressure
4 to 6 gms.

Loudspeaker box
15RH432 (two loudspeakers connected in parallel)

Loudspeaker type
2415 255 88005 (Z=8 ohms)

Mains voltage
230 volts AC50Hz

Power consumption
Recordplayer : Approx. 50 mA
Amplifier : Approx. 100 mA
(for maximum output)

Transistors & Diodes

TR1/TR6 : BC158
TR2/TR7 : BC148B
TR3/TR8 : AC126
TR4-TR5 } : AC187/01 & AC188/01 (Matched pair)
TR9-TR10 }
D1/D2 : CC2A
D3 - D7 : 4 X BY126

Indicator lamp
L1 (6.3V — 0.115A)
3115 109 10020

Controls & Indicators

1. Speed selector 78, 45 or 33 1/3 r.p.m
2. Volume control (R10/R35)
3. Balance control (R3/R28)
4. Tone control (R2/R27)
5. Pilot lamp (L1)

Adjustment of current of output transistors

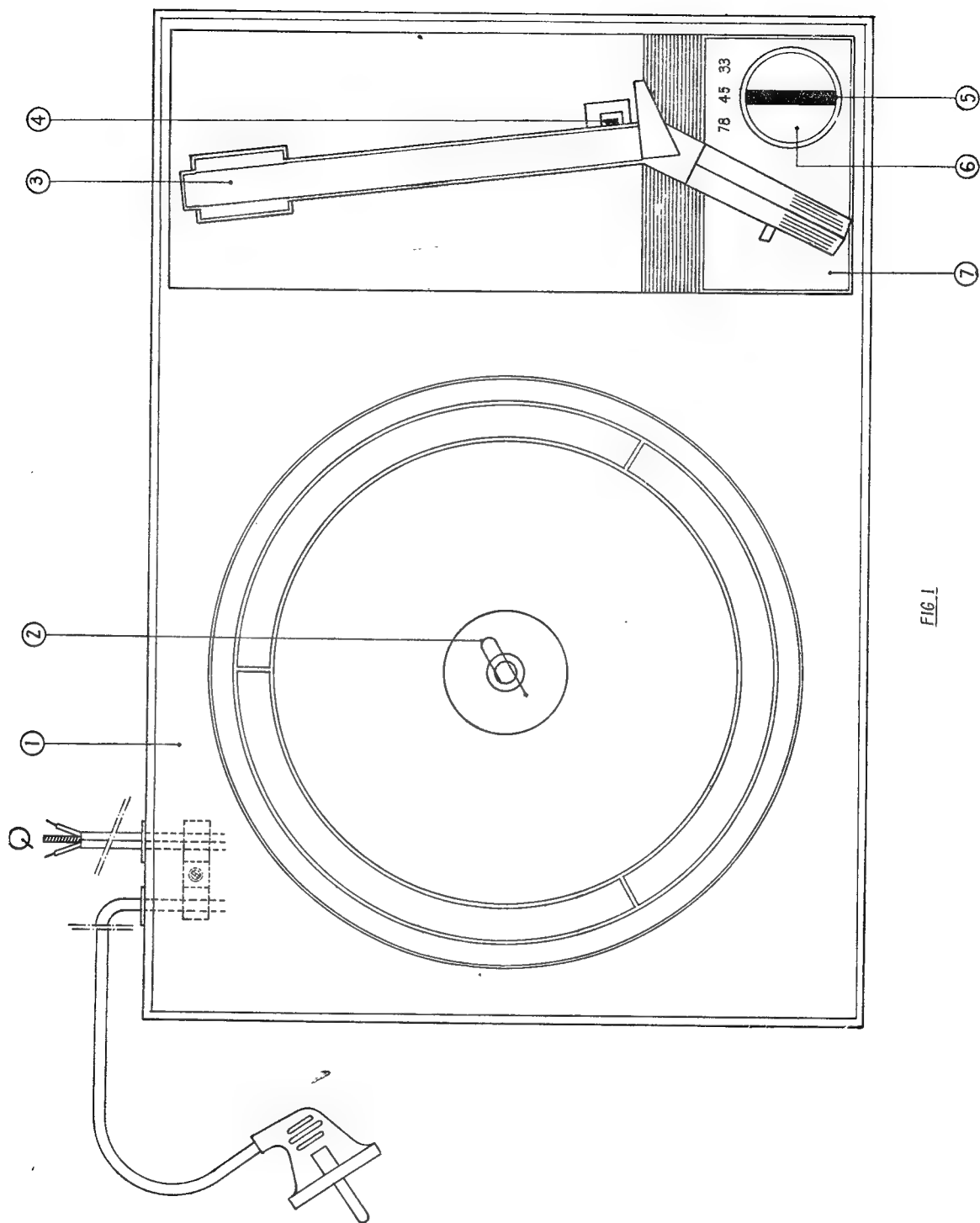
Replace speakers by 5 ohms resistive loads set both potentiometers R20/R45 in mid position. Switch on the apparatus. Adjust the quiescent collector current of TR4/TR9 to 5 mA ± 1 mA.

MECHANICAL PARTS

Description	Pos. No.	Code No.	Description	Pos. No.	Code No.
Front Assy	3115 209 00361	Block	5.	3111 154 01281
Frame (wooden)	3115 203 00181	Disc	6.	3115 204 03111
Lid (top cover)	3115 204 02391	Plate	7.	3111 150 00031
Case (bottom)	3115 204 03721	Rubber cover	8.	3115 208 03351
Feet X4	3104 104 70221	Turntable	9.	3115 208 03251
Konbs X3 (15GF832/06)	3115 208 03651	Washer	10.	3111 154 01551
Konbs X3 (15GF832/06S)	3115 208 02891	Cup	11.	3115 201 22301
Speaker/tape socket assy.	3115 209 00211	Spindle	12.	3111 154 21101
Plug for loudspeaker socket	2422 026 01021	Ornamental disc	13.	3111 151 60591
Emblem on speaker box	3115 200 00041 or	Trip lever assy	14.	3115 209 00271
Bush for output socket	3115 208 00061	Spring	15.	3111 151 00411
Mains cord	3115 204 03731	Spring	16.	3115 201 00311
Lamp holder	3115 208 50171	Wheel	17.	3111 158 01301
Grommet for mounting transformer	3115 100 10051	Ring	18.	3104 103 40241
Adaptor for 7" record	3115 204 02561	Lever assy	19.	3115 209 00281
Pickup head	3104 104 01501	Spring	20.	3115 201 00251
Stylus for above	9015 352 24007	Nut	21.	2522 401 04011
Protective cap for pickup head	3104 108 02181	Spring	22.	3115 201 00291
Loudspeaker cord assy	3104 104 03921	Washer	23.	2522 600 17027
Springs for knobs X3	2290 049 15 or	Bush	24.	3115 201 60291
Nut for fixing potmeters X3	3115 208 50201	Sector	25.	3115 151 60061
Metal plate below speed change knob	2503 996 01001	Spring	26.	3115 201 00261
Spindle for fixing motor	3115 200 40261	Washer	27.	3104 103 40261
Pickup mount	3115 201 20971	Washer	28.	3104 103 40231
Plate in pickup arm	3111 151 20711	Rod	29.	3115 201 01031
Shielded wire in pickup arm	3115 208 03391	Switch	30.	3111 158 40011
Idle wheel bracket assy	3104 101 60971	Rod	31.	3111 151 00441
Emblem on lid	3115 208 01731	Spring	32.	3115 201 00281
Spring in switch assy	3115 209 00281	Ratchet	33.	3115 201 22291
Screws for fixing :	3115 204 02391	Retaining ring	34.	2522 631 06002
Bottom case X4	3115 151 90262	Spring	35.	3115 201 00271
Front assy	3115 208 03611	Spring	36.	3115 201 00301
Mounting plate	1.	2515 123 89009	Motor	37.	3115 208 70081
Spring	2.	3115 209 00261	Retaining ring	38.	2522 634 04007
P. U. Arm	3.	3115 151 00421	Grommet	39.	3111 154 00671
Spring	4.	3115 208 01511	Rod	40.	3111 151 00481
		3115 104 00801	Screw	41.	2515 123 89002
			Washer	42.	2522 600 17018

ELECTRICAL PARTS

Part No.	Code No.	Part No.	Code No.
R2/R27 (220K ohms)	2322 390 74412	C14, C30 (64 MF)	2222 001 14649
R3/R28 (470K ohms)	2322 390 74496	C15, C31 (1MF)	2222 002 17108
R10/R35 (50K+170K ohms)	2322 390 74483	C16, C32 (640 MF)	2222 023 44641
R20,R45 (220 ohms)	2315 411 02202	C33, (200 MF)	2215 016 15221
R22, R47 (120 ohms) N.T.C.	2115 611 00003	C34, C35 (1500MF)	3115 208 70111
C1, C17 (1000 pF)	2215 561 02102	L1 (63V - 0.115A)	3115 109 10021
C9, C25, C13, C29 (500 MF)	2222 001 41501	Loudspeaker (8 ohms)	2415 255 88005
C10, C26, (320 MF)	2222 001 43321	Thermal Fuse(Z1,Z2)	3115 208 02831



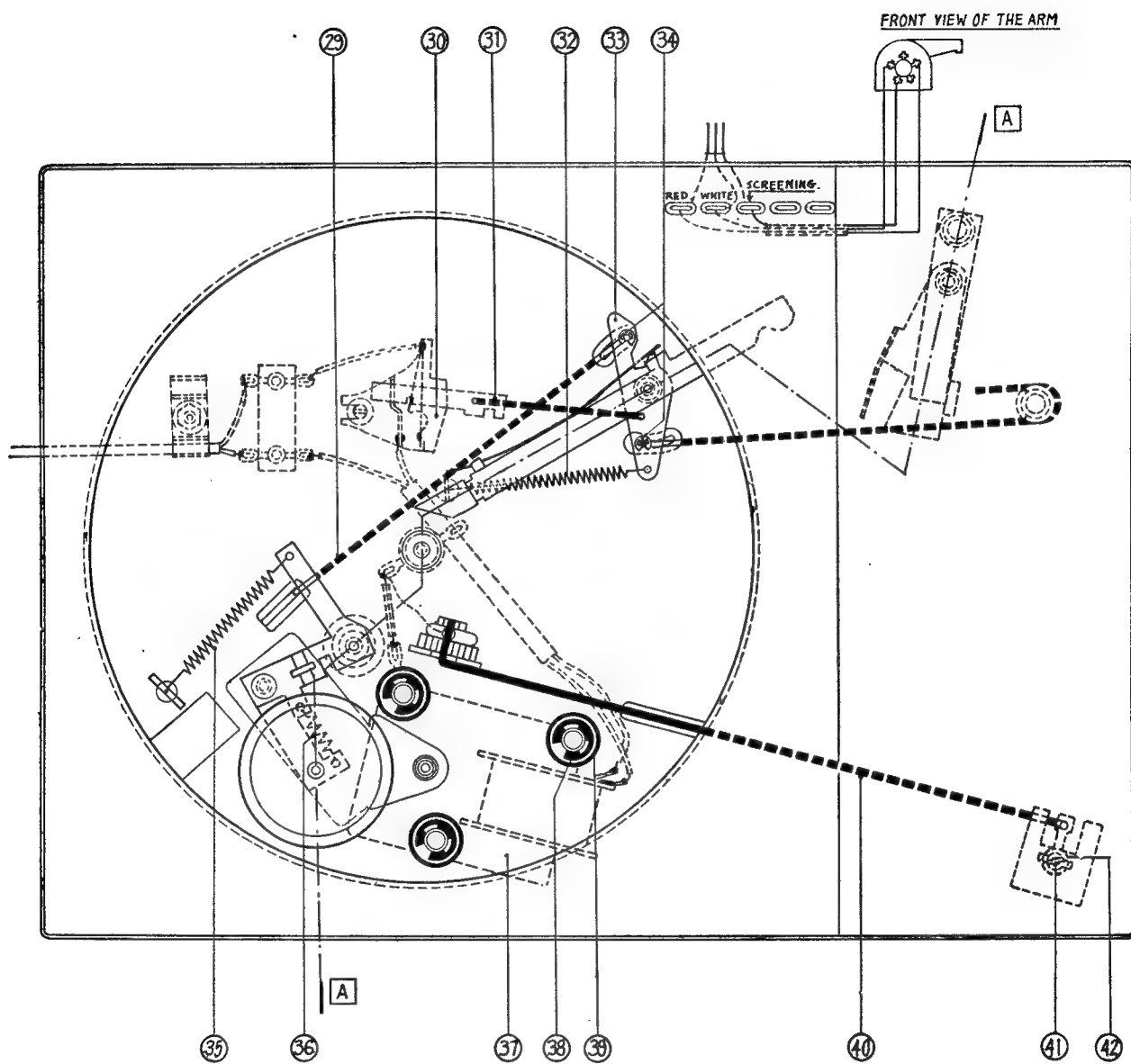


FIG 2

A-A

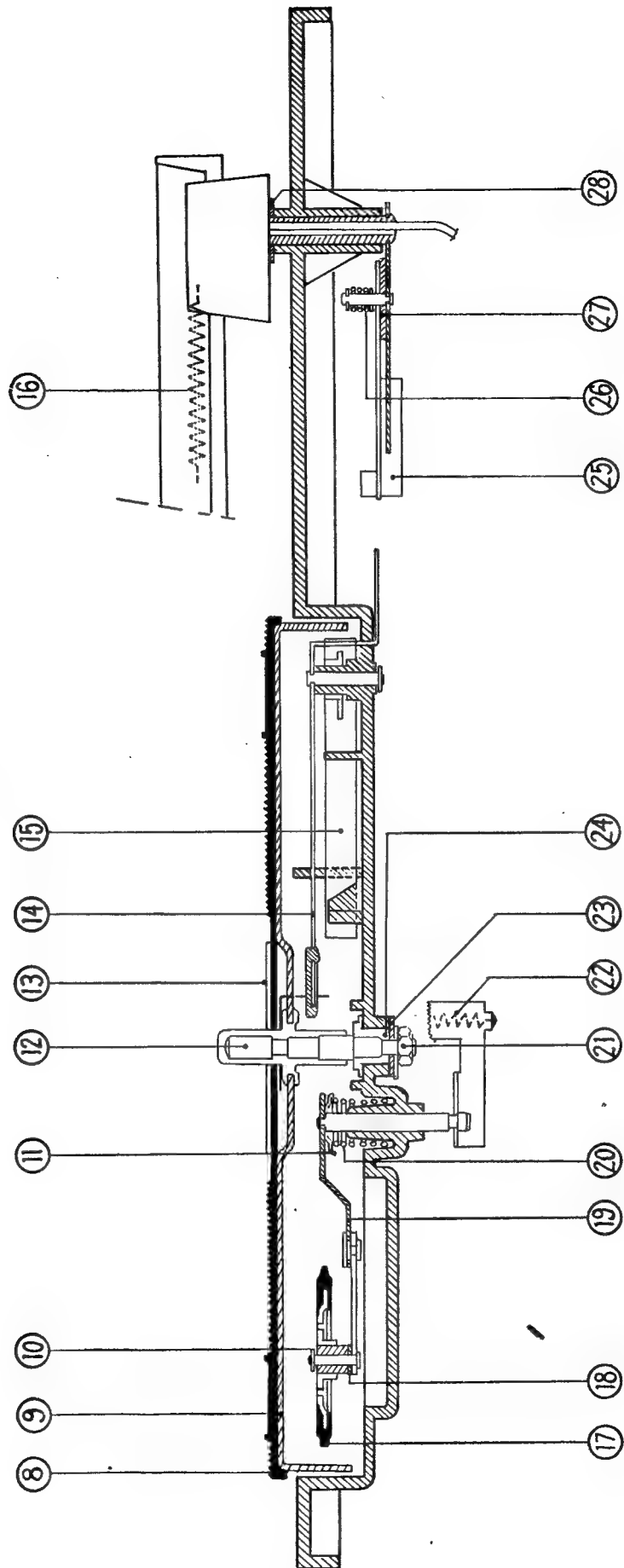
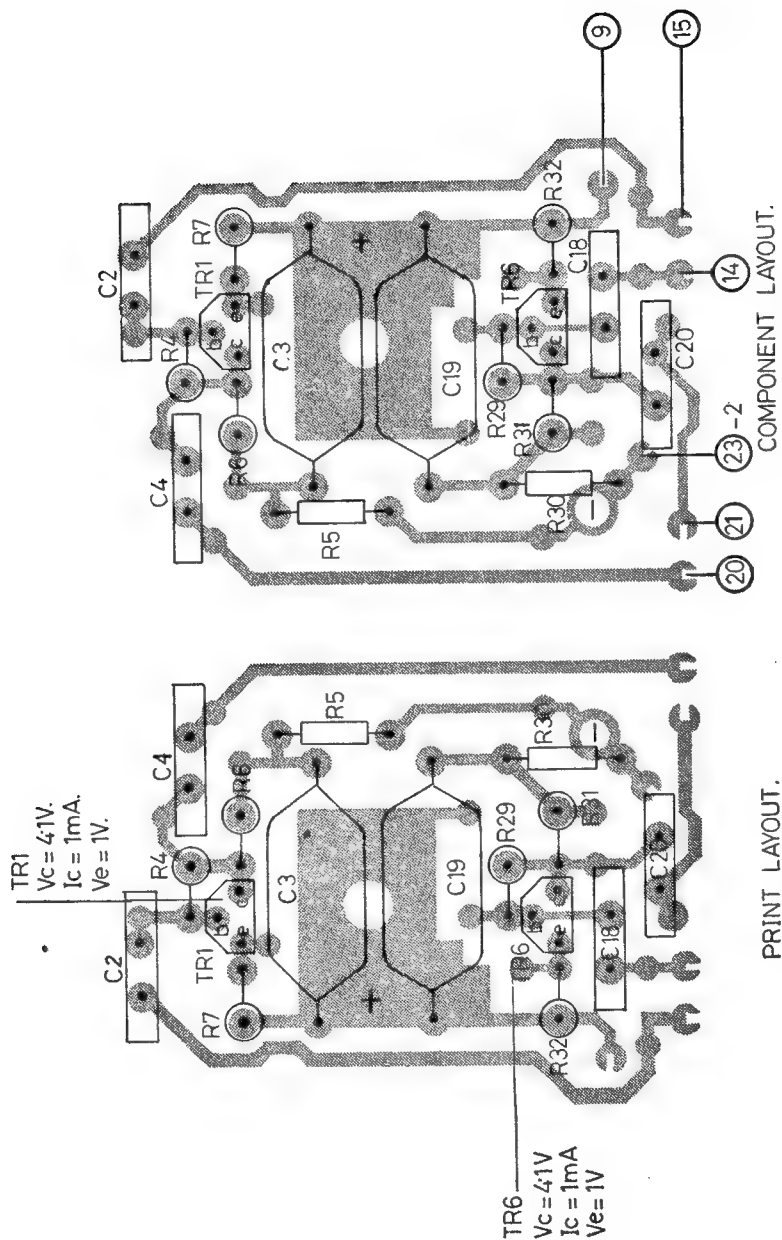


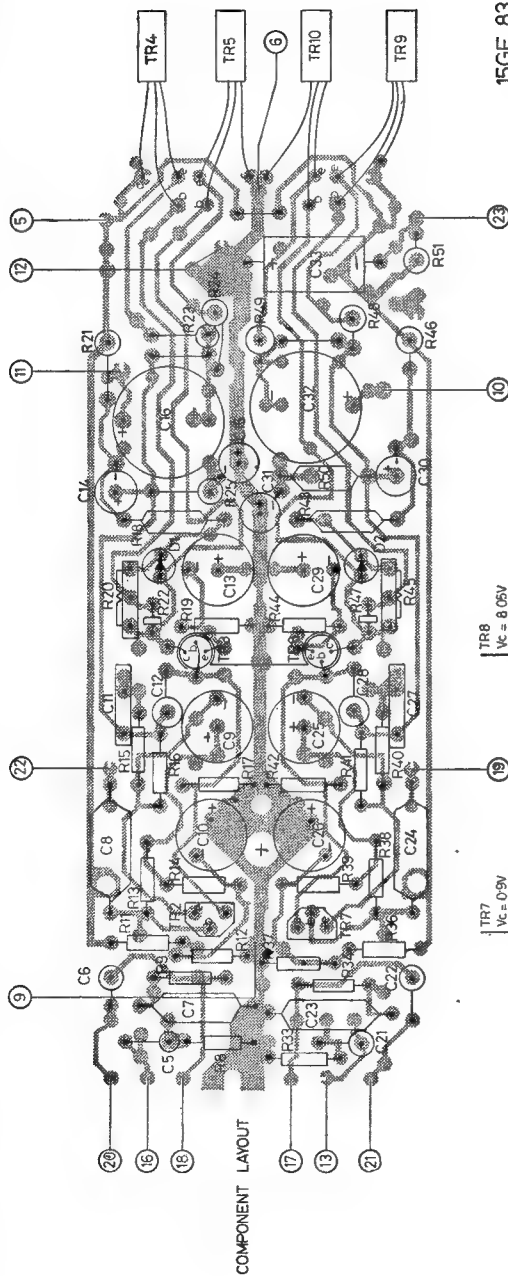
FIG 3

R	32. 7.	4. 29.31. 6. 30. 5.	5. 30. 6.31. 29.	4.	7. 32.	R
C	2. 18. 3. 19. 20.	4	4.	19.20.3	2. 18.	C
M	TR1. TR6.			TR1. TR6.		M

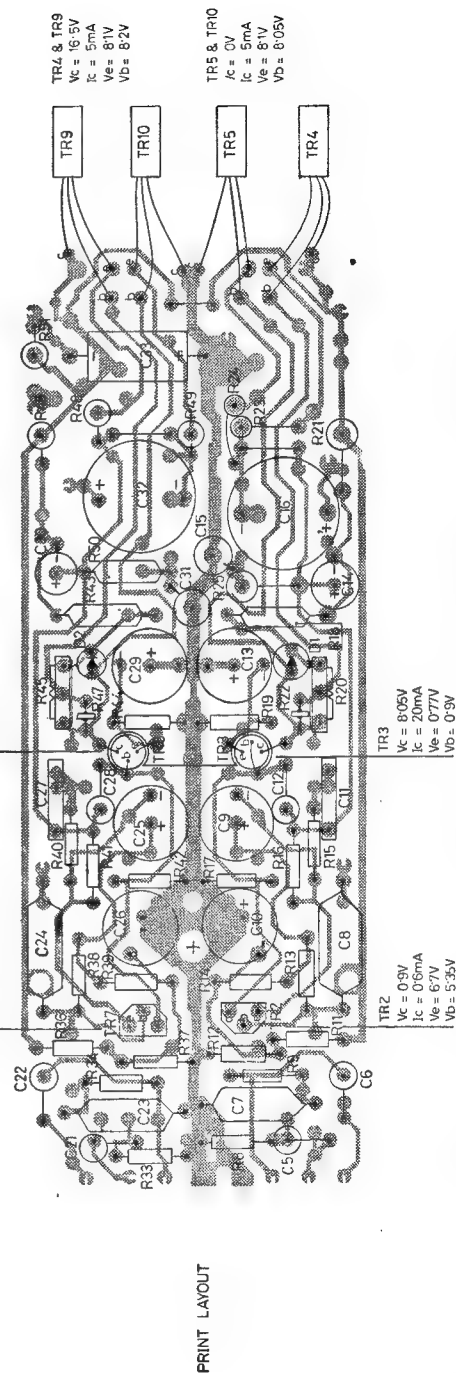


15GF 832/06

R	8, 33	34, 37, 11, 13, 14	5, 16, 17	19, 27, 40	43	25, 50	21, 23, 24	R
R		9, 12, 36	39	42, 41, 40	18		46, 48, 49	R
C	5, 23	22	8, 10, 26	9	27, 12	14	15, 16, 32	C
C	21, 7	6	24	25	11, 28	31, 30		C
M		TR2, TR7		TR3, TR8	D1, D2		TR4, TR5, TR9, TR10	M

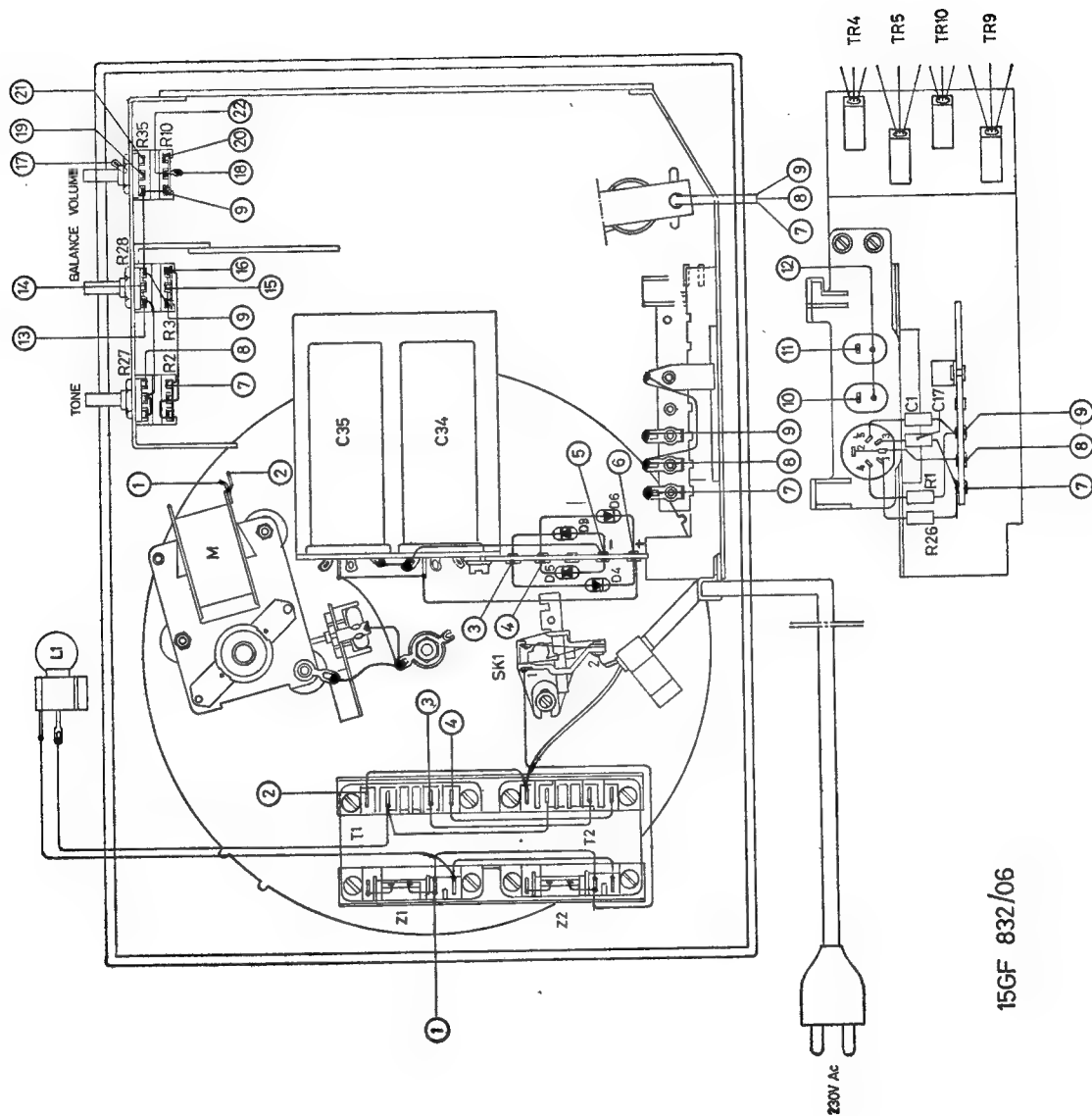


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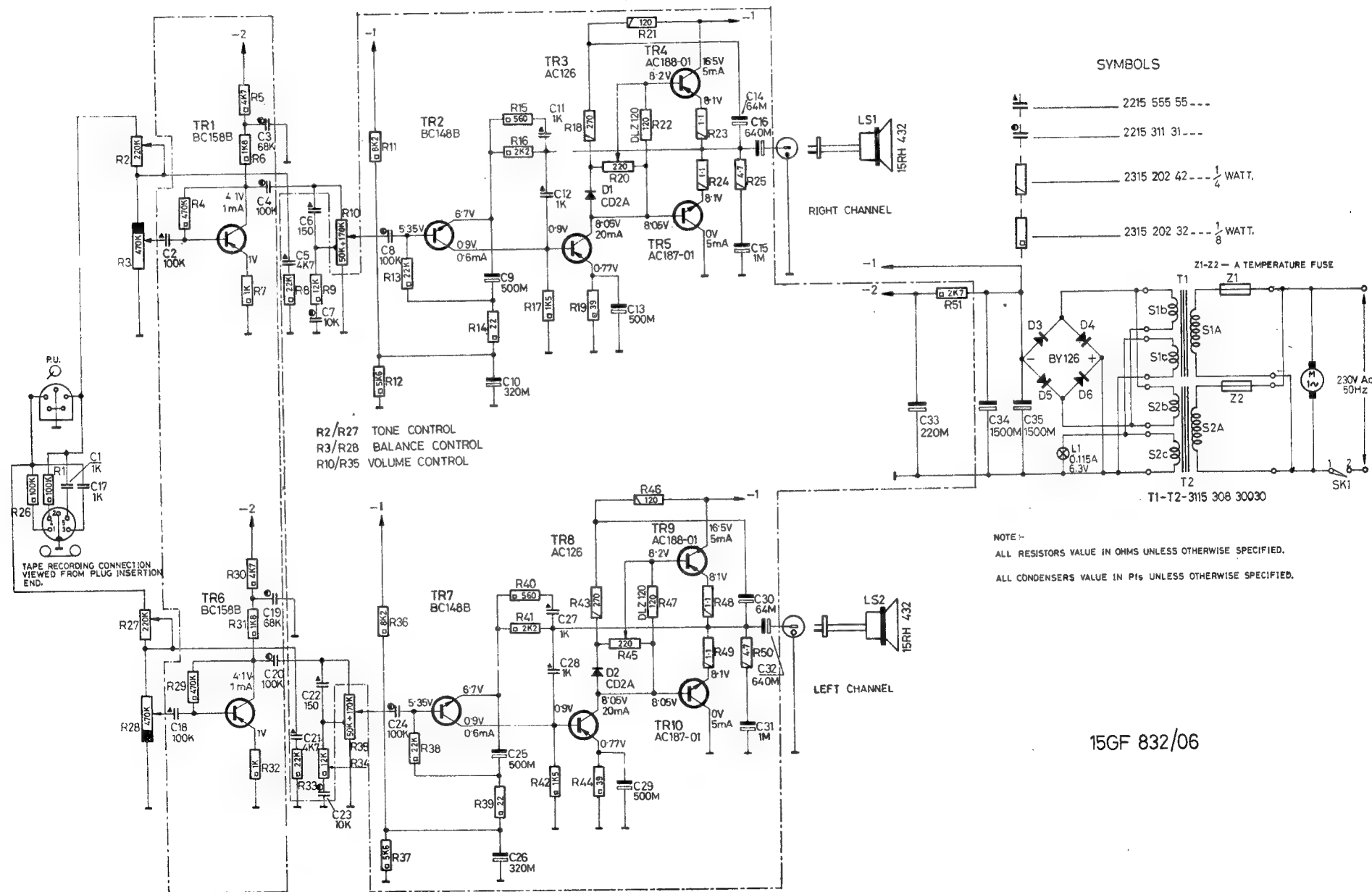
R	33, 8	34, 37, 36, 14, 38, 13	47, 41, 40	47, 44, 45	18	43, 50	21, 23, 46, 24	51	R
R		9, 12, 11	39	17, 16, 15	19, 22, 20	25	48, 49		R
C	5, 21, 23	22	24, 8, 26	25	27, 28	29	31, 30, 32	33	C
C	7	6	10	9, 11, 12	13	14	15, 16		C
M		TR2, TR7		TR3, TR8	D1, D2		TR9, TR10, TR4, TR5		M

R	26	1	27	2	3	28	35	30	R
C									C
M	SK1	L1	D405M	D3	D4	34	36	1	M



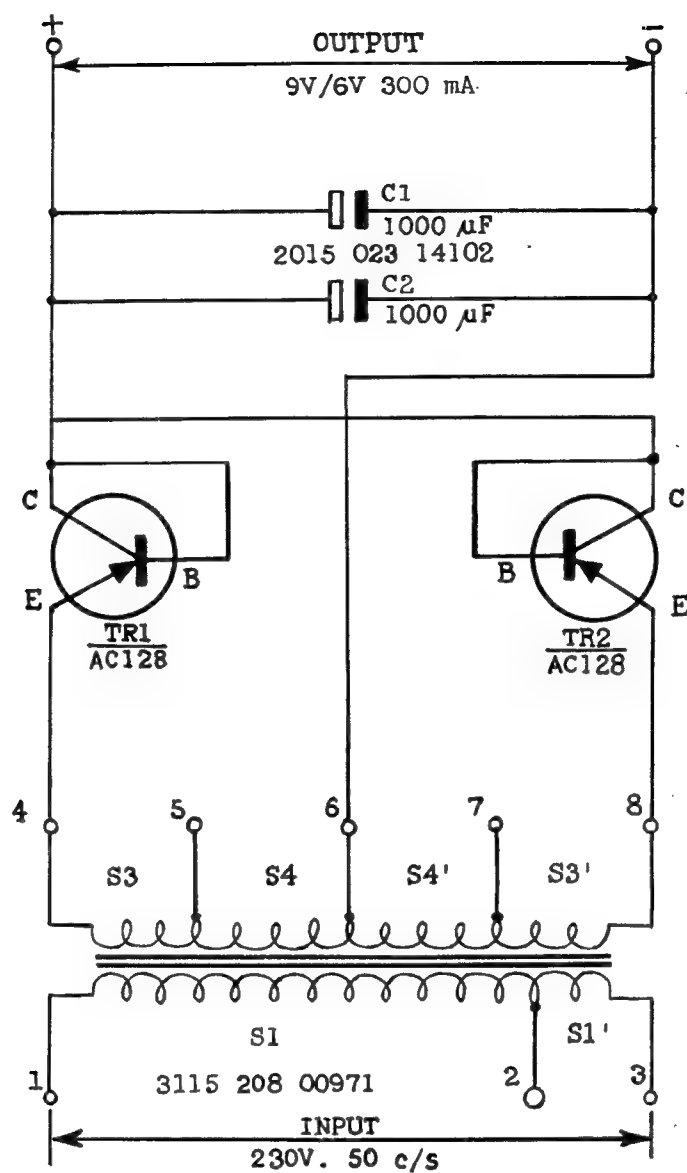
R	1.	2,3	4.	5,6,7	8	9	10	11,12,13	14.	15,16,17	18,19	20.	21,22.	23,24.	25	51.	R
C	1.	2.		3,4.	5,6.	7.		8.	9,10.	11,12.		13.		14,15,16.			C

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R	26.	27,28	29	30,31	32.	33.	34,35	36,37	38	39.	40,41,42	43,44.	45.	46,47.	48,49.	50.			
C		17		18.	19,20.	21,22.	23.	24.		25,26.	27,28.		29.		30,31,32.		33.	34.	35.

BATTERY ELIMINATOR NP 1931



MECHANICAL PARTS

Description	Code No.
Can	3115 201 20350
End Cover (top)	3115 208 00450
— do — (bottom)	3115 208 00470
Mains Cord	3115 208 50020
Fixing screws × 4	B070AG/6N × 1/4"
Washer × 4	3115 200 40030

Note :- For 205V 50 c/s supply input to be connected across 1 & 2. For 6V DC Output connect emitter Tr 1 to 5 & emitter Tr 2 to 7.



PHILIPS Service manual

15ER3001/00R



Year of release 1972

For AC Mains Supply

15ER3001/00R is a mains supply unit suitable for transistorised radios and tape recorders which normally operate on 6 volts, 7.5 volts or 9 volts battery supply. The changeover is carried out by direct soldering on the printed board.

Semiconductors

TR1 : AC 188
X1-X2 : 2×EC 051
X3 : BZ 148

Mains voltage

205—230V AC, 50 Hz

Output voltage

6 V DC (service possibility for 7.5 V and 9 V)

Rated output current

250 mA DC

Regulation

- A. Output voltage with respect to output current.
(i) 0.85 drop at 250 mA for 6/7.5V output.
(ii) 0.9 drop at 250 mA for 9V output.
- B. Change in output voltage. 9.0V to 9.7V.
Change in mains voltage. 207V to 253V AC
i.e. $230V \pm 10\%$.

Hum

- 7 mV for 50 mA output current at 9V DC.
— 5 mV for 50 mA output current at 6V/7.5V.

Dimensions

128 × 60 × 50 mm

MECHANICAL PARTS

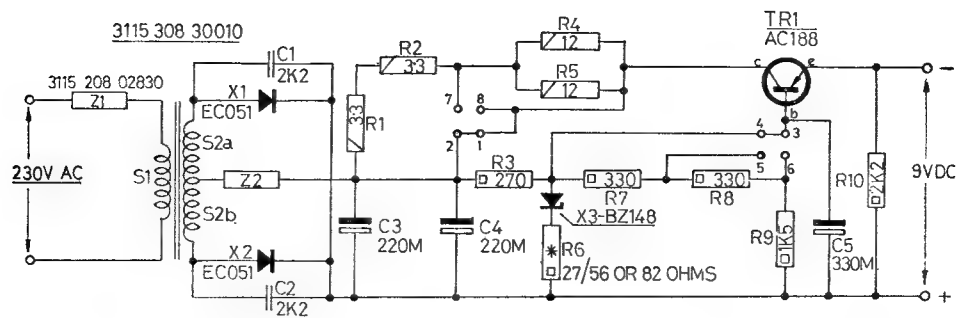
Description	Code Number
Top Cover	3115 209 00411
Base Plate	3115 104 03150
Voltage indicator knob	3115 104 03130
Emblem	3115 200 00070
Mains cord	3115 108 50910
Output cord	3115 108 50900
Grommet × 4	3115 104 03161
Output plug	3115 200 20031
Sleeve for the cord	3115 104 03120
Spring for fuse contact × 2	3122 998 10770
Heat sink (block)	3115 201 60720
Screws for fixing :—	
Top cover ×	2515 123 89009
Printed board	2515 123 89026
Transformer ×	2515 123 89009
Heat Sink	2522 001 07414

ELECTRICAL PARTS

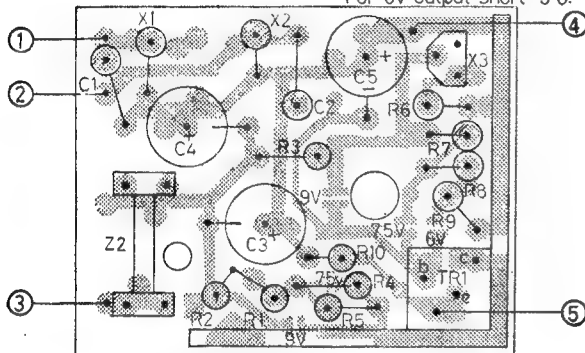
Part Number	Code Number
S1, S2A, S2B	3115 308 30010
C1, C2, (2K2 pF)	2215 563 02222
C3, C4 (220 mF)	2215 016 45221
C5, (330 mF)	2215 016 44331
Z1 (thermal fuse)	3115 208 02830
Z2 (275mA)	2415 086 10102

Note : Select Value of R6 in 9 volts configuration to give output voltage of 9.2V (± 0.2) at an output current of 20mA (± 2 mA).

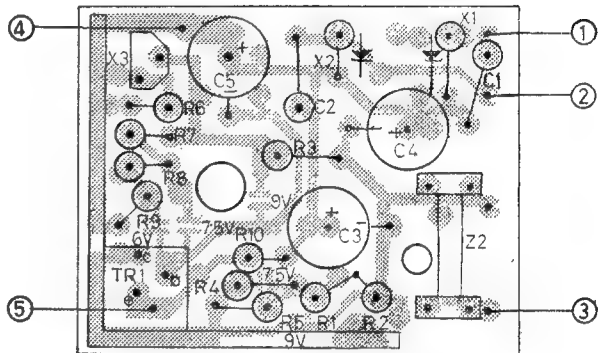
BATTERY ELIMINATOR TYPE 15ER 3001/00



NOTE The value of R6 has to be adjusted for the desired output.
 For 9V output short 1-2,3-4.
 For 7.5V output short 3-5,7-8.
 For 6V output short 3-6.



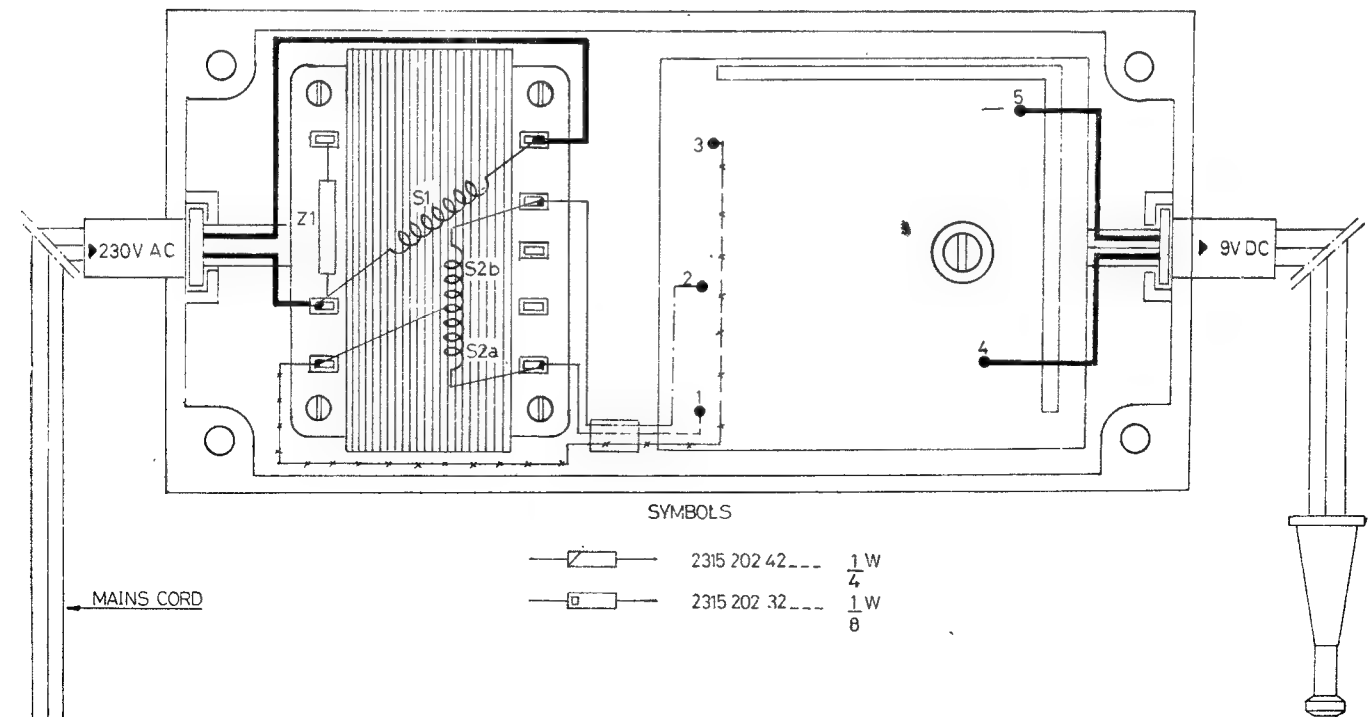
PRINTED WIRING VIEW.



COMPONENT WIRING VIEW

NOTE:- GAPS TO BE SOLDERED ON THE PRINTED BOARD FOR THE DESIRED VOLTAGE.
 CENTRE PIN OF OUTPUT PLUG IS POSITIVE.

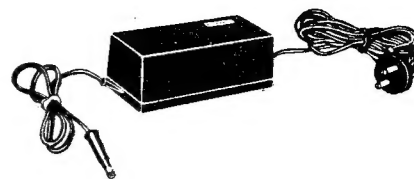
C.	1.	4.	3.	2.	5.	5.	2.	3.	4.	1.
R	2.	1.	3.	510.	4.	6.	7.	9.	8.	
	Z2, X1,	X2,	S1, S2a, S2b, TR1, X3,		X3, TR1,		10.	5.	3.	1.
										X2, X1, Z2.





PHILIPS Service manual

15ER3002/00



Year of release 1973

For 230 Volts AC Mains Supply

15ER3002 is a mains supply unit suitable for transistorised radios and taperecorders.

DC output of supply unit can be adjusted to 6 volts by means of a switch and for 7.5 volts, slight modifications are to be carried out.

Transistor and diodes

TR1 : AC188
D1 - D2 : ECO51
D3 : BZ148

Mains voltage

230 V AC 50 Hz

Output voltage

6 V or 9 V DC
(Service possibility to adjust for 7.5 volts)

Rated output current

250 mA DC

Regulation

Maximum 0.9 V drop at 250 mA output current for 9V setting.

Hum

< 6 mV for 50 mA output current at 9V DC

Dimensions

128 × 60 × 50 mm

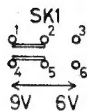
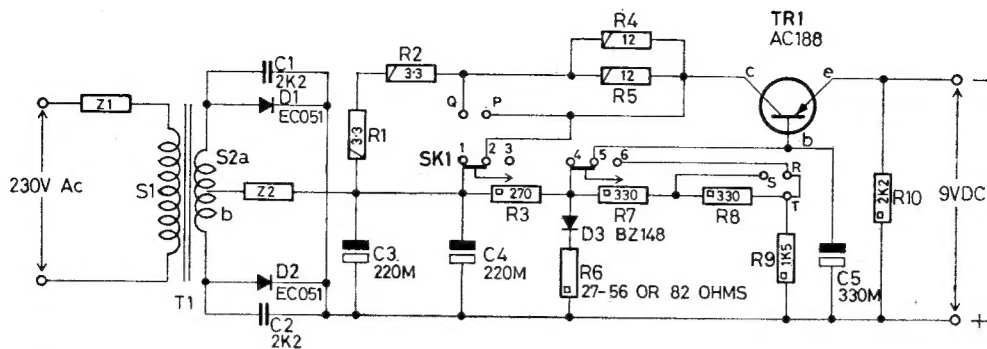
MECHANICAL PARTS

Description	Code No.
Top cover ...	3115 209 00411
Base plate ...	3115 204 04480
Emblem ...	3115 200 00070
6V/9V switch ...	3115 208 04031
Mains cord ...	3115 108 50910 or 3115 208 50260
Output cord ...	3115 108 50900
Output plug ...	3115 200 20031
Spring for fuse contact × 2 ...	3122 998 10770
Heatsink (block) ...	3115 201 60720
Screw for fixing :	
Top cover × 4 ...	2515 123 89009
Printed board ...	2515 123 88028
Transformer × 2 ...	2515 123 89009
Heat sink ...	2522 001 07414
Switch × 2 ...	2513 123 88026

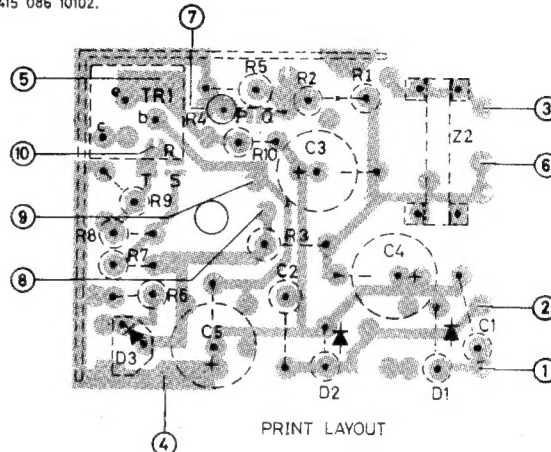
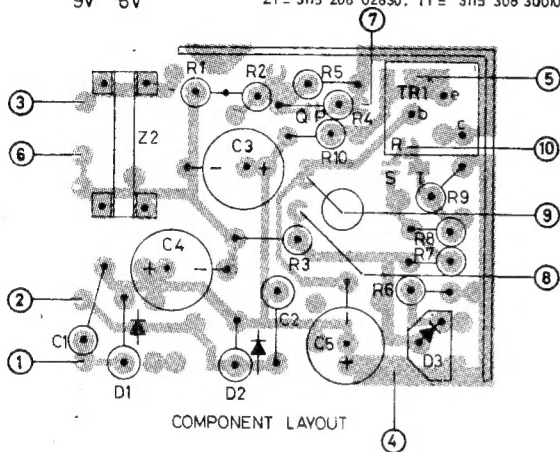
ELECTRICAL PARTS

Part No.	Code No.
T1 (S1, S2A, S2B) ...	2311 308 30010
C1, C2 (2K2 pF) ...	2215 563 02222
C3, C4 (220 mF) ...	2215 016 45221
C5 (320 mF) ...	2215 001 90016
Z1 (Thermal fuse) ...	3115 208 02830
Z2 (275 mA) ...	2415 086 10102

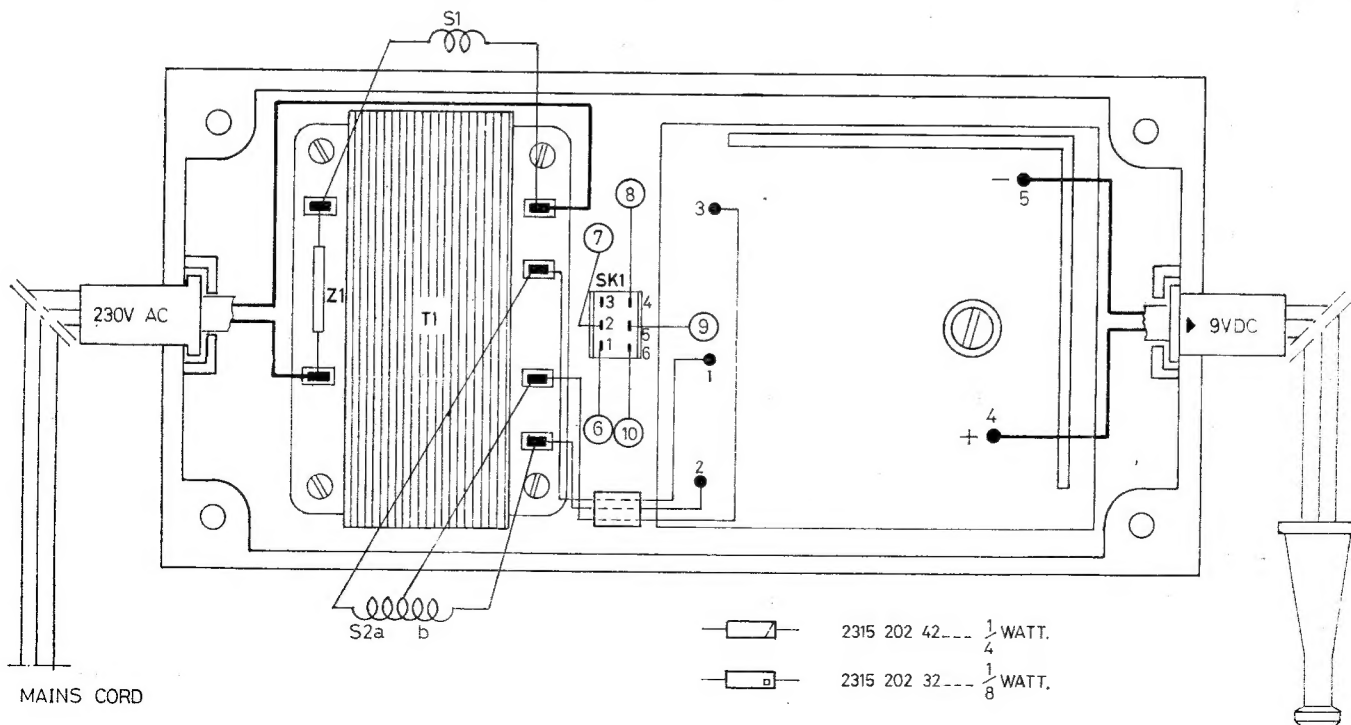
R	1. 2. 3. 6. 4. 5. 7. 8. 9. 10.										R
C	1. 2. 3. 4. 5.										C
M	Z1. T1 Z2. D1. D2. D3. TR1.										M



NOTE:-
THE VALUE OF R6 HAS TO BE SELECTED FOR THE DESIRED OUTPUT.
FOR 7.5V OUTPUT PUT THE SWITCH IN 6V POSITION. CONNECT P-Q, R-S. AND DISCONNECT R-T.
CONDENSERS VALUE IN Pfs. RESISTORS VALUE IN OHMS UNLESS OTHERWISE SPECIFIED.
Z1 = 3115 208 02830. T1 = 3115 308 30010. Z2 = 2415 086 10102.



M	D1. Z2. D2. TR1. D3. D3. TR1. D2. D1. Z2.										M
R	1. 2. 3. 10. 5. 4. 6. 7. 8. 9. 8. 7. 6. 4. 5. 10. 3. 2. 1.										R
C	1. 4. 3. 2. 5. 5. 2. 3. 4. 1.										C





It is the responsibility of the Philips Service Department to ensure that all Philips products are maintained properly during their economic life-span. Repair service is, therefore, offered by their own Service Departments at Calcutta, Delhi, Bombay and Madras, and in these and other cities through the extensive network of Philips dealers. Many of the dealers' technicians are trained in the Philips Service Departments.

The following additional services are offered by Philips for the benefit of Philips apparatus-owners, engineers and technicians engaged in service activity.

Service Documentations

Complete service documentations of every Philips radio set, gramophone etc. produced from 1955 onwards are printed with circuit diagrams and other technical details. Those relating to the years from 1955 to 1965 are available in a book-form as Philips Circuits Volume 1. Those released from 1966 to 1970 are printed in Volume 2. Volume 3 covers 1971 to 1973. Individual documentations are separately available for the models released from 1974.

Spare Parts

Over 5,500 code numbers of spare parts are stocked for servicing Philips radio sets, gramophones, etc. These components and spare parts are sold to customers, repairers, technicians and dealers through authorised Philips Radio and Spare Parts Dealers, at reasonable prices.

Service Aids

Philips laboratories have manufactured a number of simple and handy mechanical, electrical/electronic gadgets for helping the service industry. Such gadgets, called SERVICE AIDS, are low-cost, easy-to-operate, time-saving devices. Most of them are battery operated and hence are very useful tools for outdoor work and home servicing. Individual descriptive leaflets are available on request.

Other Publications

(a) Spare Parts Price List

This is a component categorywise price list with essential technical details of the parts. A copy is available free of charge, upon request.

(b) Price Manual

This is a price manual of spare parts in code number sequence. A brief description of the parts is also indicated. Limited copies are printed.

(c) **Survey of available Spare Parts (1954-1965)**

This is a publication giving the modelwise details of all available spare parts relating to Radio Models released between 1954 and 1965.

(d) **Modelwise Spare Parts Guide**

This Guide contains the code numbers of spare parts model by model of radio sets and other apparatus produced from 1966 to 1976. This will be a handy reference manual for even non-technical personnel and will be available in January 1977.

(e) **Substitute List**

This publication is a consolidated list of all obsolete parts for which current substitutes are available. It is available in a limited quantity.

(f) **Spare Parts Dealers List**

This publication is a consolidated list of organised Philips Service Spare Parts Dealers in India. Regionwise lists are available as loose leafs. The Dealer Lists have been arranged state-wise and town-wise alphabetically, starting with headquarter town of each region.